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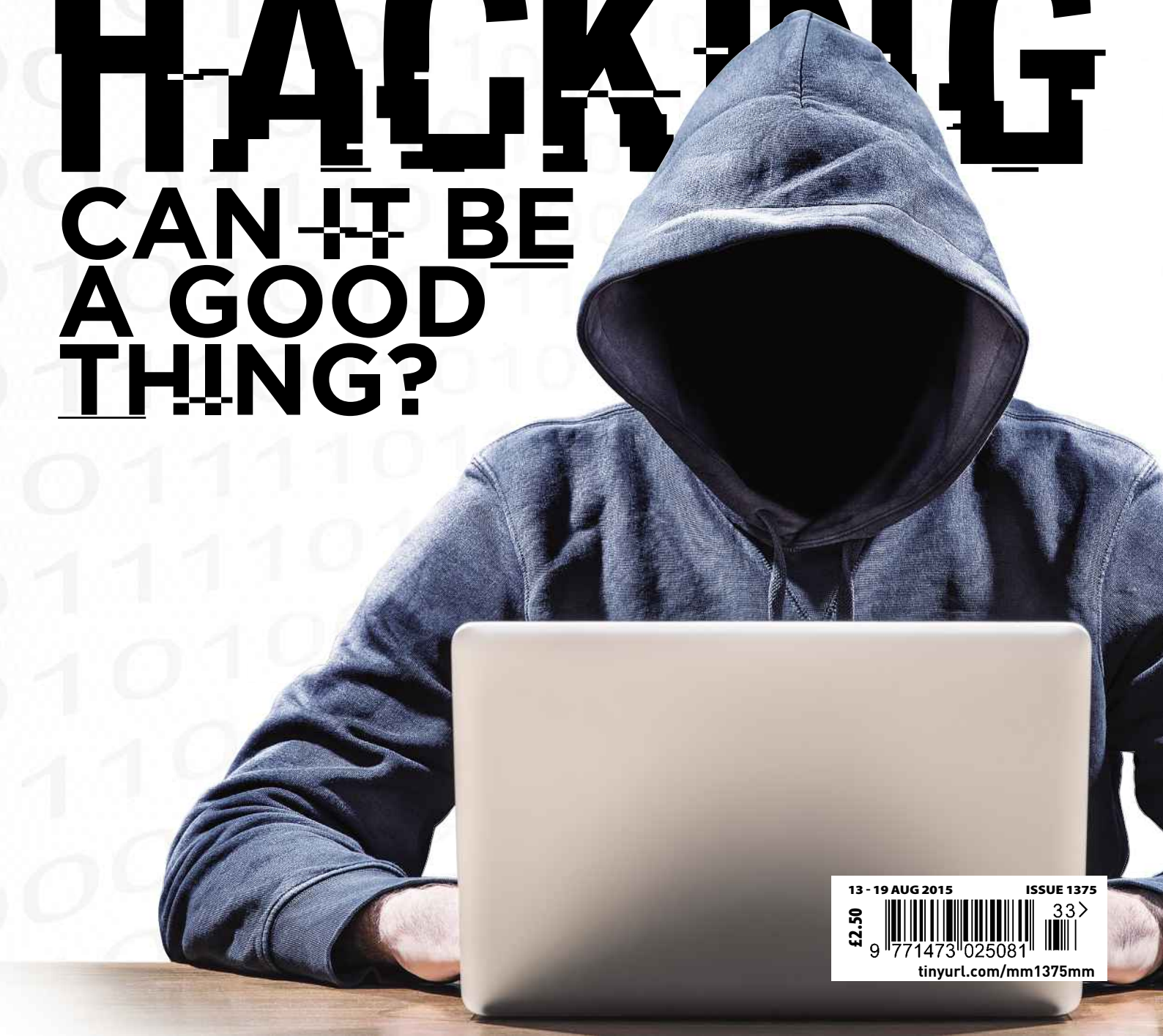

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Contents

This week...

08 Hacking: A Force For Good?

18 USB Hubs

24 Coding With App Inventor 2

08 Hacking: A Force For Good?

When you mention hacking to most people, they'll think about vulnerabilities in software being exploited by criminals for financial gain. But there also plenty hackers who do what they do for perfectly good reasons, like helping strengthen security measures by identifying flaws so they can be fixed

18 USB Hubs

If you're anything like us, then at some point you've cursed your computer's lack of USB ports, as you go to plug in a new peripheral and find you're out of inputs. What you need, of course, is more ports, and the one of the most common ways of getting them is with a hub. Does it matter which one you buy? We think so…

26 Coding With App Inventor 2

Learning how to code takes time and a lot of hard work, but Google's App Inventor software helps to make it less confusing. Nevertheless, you still might want a bit of help using it, and that's exactly what this new series is about

46 Group Test: 16GB DDR3 Kits

Although it's not the newest standard of computer memory, most of us are probably still using DDR3. That's fine, but you might find that you want bit more RAM, and we reckon 16GB should be just about right. David Hayward takes a look at six 16GB kits and put them through their paces

46 Group Test: 16GB DDR3 Kits

56 Smart TVs: Running Out Of Steam?

Group Test
16GB DDR3 RAM Kits
46 Corsair Vengeance Pro Red
47 Crucial Ballistix Sport
48 Kingston ValueRAM 16GB Kit
49 Kingston HyperX Savage 16GB Kit
50 G.Skill TridentX
51 Mushkin Redline 16GB
52 Sum up

Reviews
38 BenQ BL2711U
39 ModeCom FreePC
40 Vodafone Tab Prime 6
42 Auslogics BoostSpeed 8
43 Corsair Raptor K30
44 MyGica ATV585 Android TV Box
45 Submergedink Ledos Gaming Mouse

Experts
82 Ask Aaron
84 Ask Jason

Specialists
68 Linux Mart
69 Mac Mart
70 Mobile Mart
71 Hardware Mart
72 Gaming Mart

News
32 The Latest News
53 Your Letters

Regulars
54 Subscriptions
74 Ad Index
76 IT Essentials
78 Classifieds
88 Logging Off

56 Smart TVs: Running Out Of Steam?

If you've bought a large TV in the last few years, then it's quite likely that it will have some smart features. Just how necessary are they, though? With devices like the Chromecast doing everything they can do, and better, what's the point of having a smart TV? Mark Pickavance reports

62 Using Symbolic Links

If you're running out of space on an SSD, you can always transfer files to your more capacious but slower hard drive. However, that won't work with all files, and many have to remain on the main system drive. Thankfully, symbolic links can solve your problem, as Roland Waddilove explains

64 Internet And Mood

We all know the physical dangers associated with spending too much time on our computers, but can being on the internet for too long be detrimental to your mental health as well? Experts are saying it can, and as Sarah Dobbs tells us this week, sometimes it's best to just log off and do something else

Also In This Issue...

28 Remembering
David Hayward recalls a Nintendo console that didn't do quite as well as it deserved to

30 Component Watch
Where to grab yourself a cheap second monitor

67 Top 5
A selection of ways to make a smartphone dead

86 Crowdfunding Corner
Could one of this week's projects be worthy of your backing?

87 App Of The Week
Make your pictures more retro with this week's app

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Hacking: Can It Be A Force For Good?

Hackers are usually seen as nasty individuals wreaking havoc on computer systems worldwide. But are they? David Crookes finds out

For the last five years or so, a "mysterious figure" known as The Jester (his leetspeak handle being th3j35t3r) has been a claiming responsibility for a series of high-profile online take downs covering dozens upon dozens of websites. His work has become so infamous that he has his own Wikipedia entry and yet, while he has revealed himself to be a former soldier who served in Afghanistan, his identify remains unknown.

To reveal himself beyond the anonymity the world of social media affords would almost certainly put him in grave danger. That's because The Jester is waging a war of his own; rallying against websites belonging to jihadist propagandists.

"I realised something needed to be done about online radicalisation and 'grooming' of wannabe jihadis," he told CNNMoney. Disrupting them is his answer, it would seem.

In the course of his campaign, which has also seen him hit targets as diverse as Wikileaks, the site of Iranian President Mahmoud Ahmadinejad and the Westboro Baptist Church in the name of American patriotism, The Jester has become an online celebrity. He has his own website, **jesterscourt.cc**, and lots of supporters too. A fair few of them visit the 'Jestergear' section of his site to snap up water bottles, thermos flasks, t-shirts, watches and iPhone cases, most of which bear various slogans ("make #waswas not #ISIS", says one).

The Jester likes to post links to his press highlights over the years, from the articles in Time magazine (where he has been named one of the 30 most influential people on the internet), to the cover of Homeland Security Today, to a reference on the Larry King Show. Donations are, of course, welcome, allowing him to continue his work... It is clear he is a hero to many.

He is also not alone. Vigilante hackers exist across the world. Men and women, young and old. They are housewives and unemployed. They are working as solicitors and businessmen. They live in big cities and the smallest of hamlets in the largest of houses and the tiniest of flats. Some of them go after people who attempt to scam using spam emails that seek to trick others out of their money or personal details. Some of them, like laywer Shannen Rossmiller, seek to trap those who have been radicalised. Brad Willman in Columbia distributed a Trojan

The Jester has become so well known that he has appeared on the cover of magazines.

Mad As A Black Hatter?

Imagine attending a conference where people discuss security flaws and internet attacks. That's the Black Hat security conference in Las Vegas, which took place between August 1st and 6th this year.

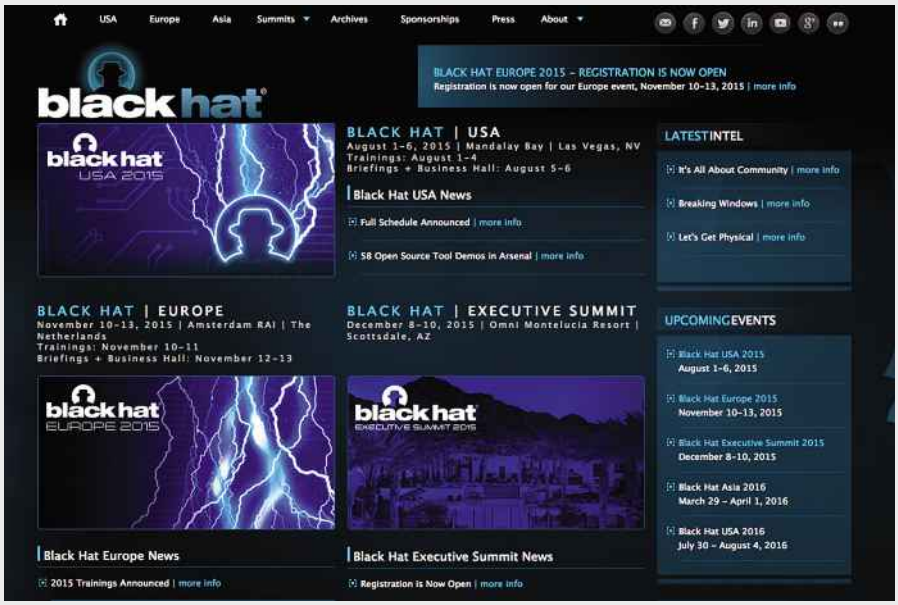
While the term Black Hat tends to have negative connotations, this conference is very much a force for good, with more than 10,000 security professionals, government workers and researchers gathering to find out just how they can better prepare against attack from criminal organisations.

Among the talks this year have been deep discussions about hacking chemical production facilities and taking nuclear power plants offline. Delegates have also looked at how criminals and bad hackers may seek to remotely control connected cars.

The event included four days of intense training for security practitioners and there was also a survey. The results showed that 35% of respondents had to deal with security vulnerabilities introduced by their own application development team and 33% from the purchase of off-the-shelf applications or systems.

The report said: "Many Black Hat attendees feel that key threats are being overlooked. Twenty-six percent of respondents say that phishing and social engineering do not get enough attention in the media and at industry events. Accidental data leaks by end users and new vulnerabilities introduced by off-the-shelf software are also areas that are do not receive adequate attention, respondents said."

Good hackers will continue to exploit these systems in order to find the vulnerabilities that can then be plugged so that criminals do not get there first and wreak havoc. But with warnings at Black Hat that "the growing online threat also is putting continuous pressure on security staffs and departments, even in the largest and most security-savvy organisation" it would seen there is a lot more "good hacking" that needs to be done in order to make networks and computer usage that bit safer.



The face of acceptable hacking? An Anonymous member in Prague.
Image by David Sedlecký/Wikimedia Commons

horse program to more than 1,000 people in a bid to uncover child-porn activities. Around 70 people were jailed as a result.

Laws Unto Themselves

One thing is for sure, these 'Hacktivists' cannot be ignored. They are challenging not only the people they target but everyone of us, making us rethink our view of hackers. It is easy to think of them as people who disrupt the harmony of the internet, causing inconvenience and engaging in criminal acts, but the distinction between good and evil is very much blurred here. Some of these groups and individuals are performing what many believe are good deeds.

The most well-known of all of the hacking groups is Anonymous, whose members and supporters are often pictured wearing 'V' masks, an iconic disguise first made famous by the insurgent character V from the Alan Moore/David Lloyd graphic novel *V For Vendetta* and the subsequent movie adaptation. Rather than being out on the streets protesting, though, Anonymous members tend to sit behind their computers tapping away at their keyboards, seeking to wreak havoc amongst those the group has decided to turn its ire against.

Its now-iconic choice of disguise could, and most likely does,sell countless sloganed t-shirts, but those who are part of it seem to revel in the power that they are able to wield, rather than any revenue they generate – perhaps buoyed by the knowledge that any applause they receive enables the group to carry on its work for a while longer.

Earlier this month, Glenn Canning who lives in Halifax, the capital of the province of Nova Scotia, Canada, praised Anonymous for threatening to publicly identify boys allegedly involved in the cyberbullying that led to the death of his daughter, Rehtaeh Parsons. Had it not been for Anonymous, he argues, the boys would never had been brought to justice. "I have no question about that at all," he told The Canadian Press agency, following Anonymous' success in prompting the police in Halifax to reopen their investigation, and eventually lay charges.

Certainly, in the face of injustice, people will invariably seek their own solutions and hackers like Anonymous, in cases such as these, are being seen as a force for good. This is being reinforced by many respectable websites, which list the various great things that are being done in the name of hacking.

In a lot of cases it is difficult to argue against the evidence. Its campaign against white supremacist radio show host Hal Turner in December 2006 helped to establish the model it would follow, and was widely applauded. However a subsequent series of denial of service attacks attack on the Church of Scientology's website (named 'Project Chanology', presumably as a nod to the group's spiritual home, infamous bulletin board 4Chan) split opinion on the group's moral grounding in some quarters.

One of the most successful campaigns by Anonymous was the targeting of websites carrying indecent images of children. Acting under the banner

Breaking Windows

Hackers both good and bad are already trying to break into Windows 10 to see if they can exploit any holes. The only hope is that the good get to plug the gaps before the bad discover them. According to noises coming out of the Black Hat conference in Las Vegas earlier this month, "Windows 10 goes some way toward defeating client-originating Pass-the-Hash attacks" (a hacking technique that allows an attacker to authenticate to a remote server/service). The new operating system allows hashes and other secrets to be hidden even from the kernel. Has it tightened web security, though?

A press release from the recent Black Hat conference (**tinyurl.com/pwr5qn7**) showed that people have already spent a lot of time with EdgeHTML, Microsoft's new web rendering engine, in search of weaknesses and were ready to present their findings to a wider audience, something the conference says is "essential for greater understanding so that hackers can be stopped."

> **"Taking down white supremacist radio show host Hal Turner in December 2006 was widely applauded"**

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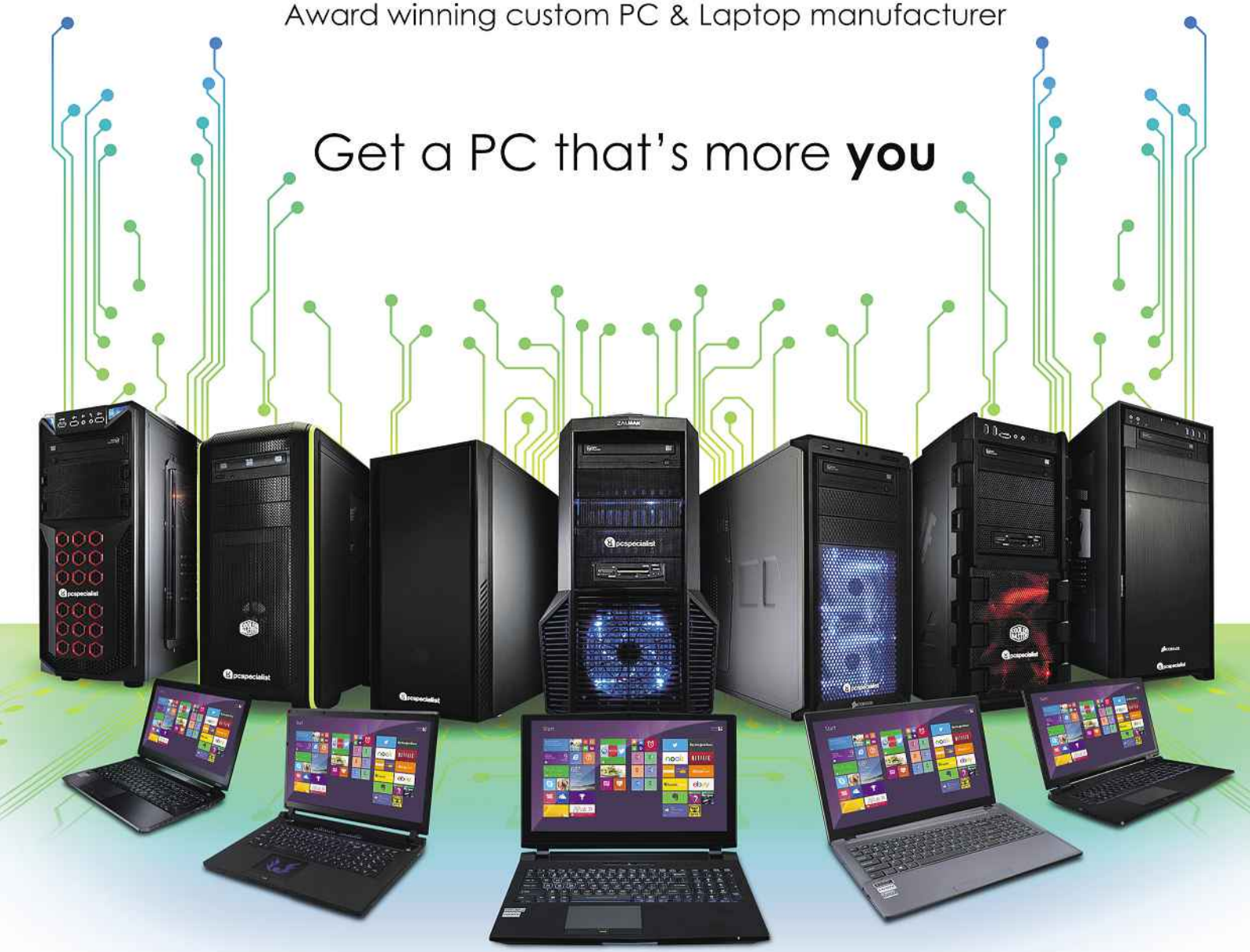

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Barnaby Jack helped to close many security loopholes. *Image by Marc Handelman/ Wikimedia Commons.*

'Operation DarkNet', in 2011 Anonymous turned its attentions to tech-savvy people using Tor's encrypted network to hide their identities and locations, and enabling them operate outside of the reach of the police due to regional borders or the lack of understanding of the technology and its scope. Anonymous, unrestricted by such matters of law or lack of knowledge, successfully brought many sites down – not only doing something that authorities ought to have already been doing, but reinforcing its strong stance against explicit underage materials being posted online. The action also underlined Anonymous' support for civil rights (the group also claims to be for free speech and democracy).

The group has more recently followed this up with a campaign called Operation Death Eaters, which is began in February 2015. Described as "an international day of protest against child abusers, and those who support child abuse on internet pornography rings through networks such as *** and ***" (the asterisks have been added by ourselves so as not to inadvertently highlight any networks used for such activity), it again showed the potential of hacking as a force for good, albeit one acting outside of the safeguards that the law provides those who are accused.

Indeed, to some Anonymous has become an unofficial internet police and army rolled into one. It has attacked ISIS' social media accounts, claiming it was an act that destroyed "months of recruiting work". The message is sent out was strong: "ISIS: We will hunt you, Take down your sites, accounts, emails, and expose you. From now on, no safe place for you online… You will be treated like a virus, and we are the cure… We own the internet… We are Anonymous; we are Legion; we do not forgive, and we do not forget. Expect us."

Moral Or Immoral?

This kind of hacking could be termed 'ethical' even though it is, technically, still very much illegal. There are a good many who would rally against it, however. They include Colin McLean, a lecturer in Ethical Hacking at the University of Abertay in Dundee, who discusses the issue in an interview on these pages. For people such as himself, such issues should be dealt with solely by the police or some other legal authority.

The problems come when people feel that hacking groups can replace official bodies. "Why go through the courts? Why go through the system?" Mr Canning told a journalist. "Why be revictimised again when you can write something and get hold of some people online who can really do a hell of a lot more to bring you a sense of justice than the police and the courts can?" Certainly, it is easy to argue the case, since the very definition of vigilantism – which is what this kind of thing is – describes a civilian or organisation that undertakes law enforcement of actions in the pursuit of self-perceived justice that is without legal authority.

> **"If it wasn't for Barnaby Jack, ATMs would be far more vulnerable"**

This tendency to vigilantism raises many moral questions. As Wayne MacKay, a law professor and cyberbullying expert at Dalhousie University, puts it: "Even if they're filling a hole in our justice system does that justify breaking the law?"

While the good is easy to see, what harm can it cause? Alongside the abstract moral conundrum of whether it's ;'right', there's a danger that the likes of Anonymous and The Jester could be damaging work being carried out officially. In some cases, government agencies and the police are already aware of the sites and people being targeted. By pulling sites and social media accounts and by publicly naming folk, the chances of building a careful legal case that would hold water in court is harmed. Hacking could ruin much hard work and it could also taint evidence or gather it in such a way that it proves inadmissible.

Jennifer L. Hesterman, a retired US Air Force Colonel and professor of counter-terrorism studies at American Military University, also points out that "hacking jihadist sites may cause them to move underground, which leads to more work for intelligence collectors." Terrorists' use of the internet, she adds, "often yields valuable data about their location, communication patterns, etc."

Aside from the effect on law enforcement, she also draws attention to another argument against the potential for hacking to be an unchallengeable force for good: "open source analysts, theologians, social scientists, psychologists, and professors all visit extremist sites to glean information on shifting ideology, social trends, and subtle changes in behaviour."

Yet there is still the feeling that some hackers are acting in a positive way. If it wasn't for Barnaby Jack, for instance, ATMs would be far more vulnerable than they are. When he was 32, he attended the Black Hat computer security conference and he showed that he was able to hack a cash machine in real time – a problem that was quickly resolved before millions of pounds of cash ended up in the hands of thieves. He also showed how smart medical devices were insecure and easily hacked.

By installing malware and exploiting vulnerabilities, Jack highlighted many dangers. Every time he was able to demonstrate this, it gave the potential 'victims' of his processes a change to close the loopholes and make their systems more secure. Jack even showed it was possible to assassinate someone by hacking their pacemaker, something that had been seen on the TV drama series *Homeland*; that brought awareness that the fiction could be come very real, and the vulnerability has since been removed.

It is such a shame, then, that – just before Jack was going to give a presentation on hacking heart implants in 2013 – he died, his life ended by an accidental drug overdose. His death was met by many online tributes praising his good work: "He was a much better person than he was a hacker, and that is saying something," said one Tweeted condolence. Dan Kaminsky, the American computer security specialist and the chief scientist of White Ops, a firm that specialises in detecting malware activity via JavaScript, wrote: "Nobody caused such hilarious trouble like @barnaby_jack."

Ethical Hacking

The University of Abertay in Dundee began a BSc in Ethical Hacking in 2006, showing students how to head off criminal threats to computer systems. Its graduates are highly sought after. Colin McLean, lecturer in Ethical Hacking at the University of Abertay in Dundee, tells us why.

Micro Mart: Why did the university start an Ethical Hacking degree?
Colin McLean: I was working in Dundee, looking at the security of cash machines and essentially my job was to think of as many ways as possible to break into the ATM and take them out. The idea was to look at the countermeasures we could use. The role was about thinking like a criminal to stop the criminals and the feeling that if you don't think like one, you can't effectively counteract the crimes.

MM: Is there a big demand?
CL: At the time, NCC which is the largest security testing group in Europe, said it was keen to employ graduates with these kinds of skills. There are now 150 students and employability is at a maximum. Graduates are getting fabulous salaries and most of them are working in security testing. What we're finding is that some of our graduates have job offers by January even though they leave in June and there are probably only a couple of students out of 30 without jobs at the moment, which is unbelievable. The NCC group has 15 of our graduates and essentially graduates are testing the security of a company or website and telling them what they have found and how to stop it.

MM: Where are the jobs?
CL: Most of the jobs are in England but we're finding that Scotland is wakening up, I think.

MM: What is the reaction among people about the course?
CL: I think people are quite surprised initially, but when you explain that you have to know what criminals do before you stop it, most people are fine. Ethics and the law certainly play a big part in the course. With any hacking subject we teach we look at the law, probably every week so that everyone is clear what is legal and what is not legal.

MM: Do you worry you're giving people the tools for unethical hacking?
CL: You can say that about many many courses. Certainly degrees in accountancy these days have modules in forensic accounting, which is basically equipping them with tools to hide money. You can argue the same case about civil engineers – showing people how to build a structure means they know how they can bomb it and do maximum damage too.

Think of medical degrees: do we stop them because of Harold Shipman? Every degree has a element of knowledge that can be used for good or bad. Do we educate or do we not? I think we have to educate because the hacking problems are huge and becoming more and more so. I think we need more and more degrees that we look at what criminals can do.

MM: What about Anonymous, which often retaliates against certain sites. Are they a force for good?
CL: That is hacking. There is a difference between legal and illegal hacking. What we teach students is legal hacking and I can't condone illegal hacking at all. Anonymous is illegal hacking and it's as simple as that. Whether there are ethical or moral issues involved, it is illegal. It is like, it is acceptable to beat up a paedophile or someone who has killed a murderer? The law has to take care of that. Should we mob handed go and sort these people out; or do we go to the police? In my opinion we go to the police.

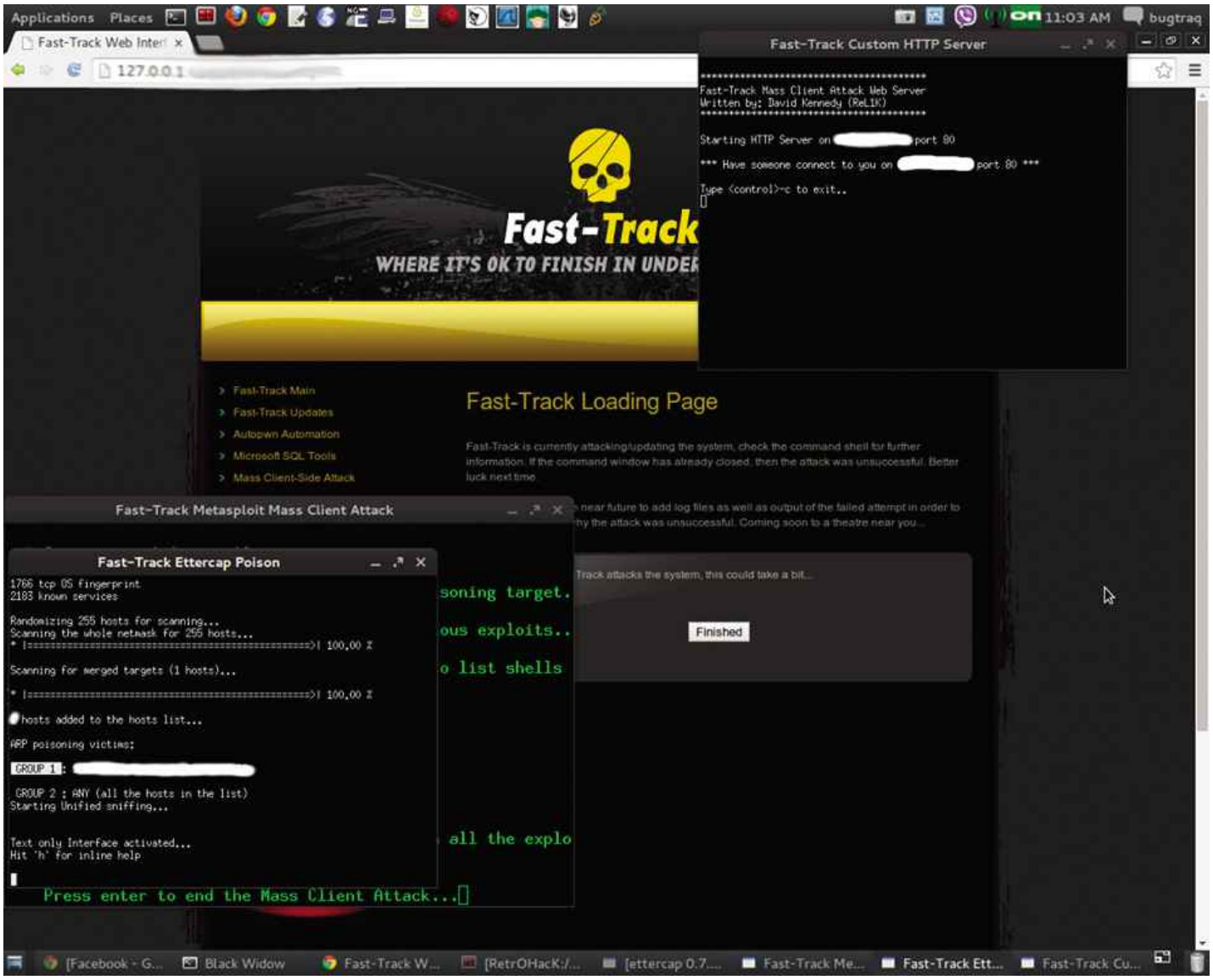
MM: How widespread is hacking?
CL: It's becoming bigger and bigger. Security testing is huge and the cost of a data breech is becoming larger and larger even as far as reputation is concern. More and more companies are wakng up and realising the data they have must be secured. We are also finding a number of graduates get jobs with banking organisations, the likes of HSBC, Tesco Bank and so on. They employ our graduates and it is having this devious mindset that works. It's about looking at what criminals do and how we can counteract that.

A Lesson In Hackstory

Kaminsky himself is also worthy of accolades, given that he discovered a major internet security hole in 2008 that could – had he not brought it to the attention of Microsoft, Cisco and other major firms – have undermined the Domain Name System. Such a breach would have allowed any bad hacker to redirect people looking for a legitimate website to one that was fake. Kaminsky proved once again that hacking can be a force for good.

Indeed, it's worth noting that the meaning of the word 'hacking' has been skewed many times over the years. It originated within the model railway club at MIT, Boston, originally describing someone who applied ingenuity to create a clever result. As the years rolled by, it came to mean someone who was committing an illegal act, a definition which those still part of the model railway club today roundly detest. They would prefer the expression "computer vandals".

Times are changing, though, and hacking isn't necessarily seen to be entirely illegal. People talk of 'lifehacks' which, as **lifehack.org** points out,



▲ ***How people see hacking in progress*** *(Image by retrohack/Wikimedia Commons)*

consists of pointers on productivity and getting things done: "tips for life", if you will. There are also attempts to reclaim the word. The Urban Dictionary points fingers and says: "Hacking and hackers are commonly mistaken to be the bad guys most of the time. Crackers are the ones who screw things over as far as creating virus, cracks, spyware, and destroying data."

Even so, care really does need to be taken by the good hackers, as Gary McKinnon realised after he infiltrated US government computers in search of little green men. McKinnon has long said his motivation was entirely innocent and that he believed he was doing a good thing in trying to unearth the 'truth' about aliens, but he was arrested twice – 2002 and 2005 – and the US authorities tried to extradite him to face charges of causing $800,000 worth of damage to military computer systems. That's a crime that could have seen him jailed for 60 years but, fortunately for him, Home Secretary Theresa May withdrew her extradition order in 2012.

Black Or White?

Some who hack for 'good' have had positive results, and received much praise. Charlie Miller embarrassed Apple with a display of security flaws, highlighting vulnerabilities in the iPhone and a bug in the MacBook Air. They were then fixed. Johnny Long preyed on Google to find holes, and that helped the search engine giant safeguard the personal information stored on its databases.

These are the white hat hackers; people who want to do good and frustrate the black hat hackers, who epitomise what people think all hackers are – someone who is destructive and hellbent on making life a misery for other people.

As if to underline the positives, dozens of hackers gather for an annual event called Hack for Change in Austin, Texas. This year 179 turned up, 35% of which were women. It's an event that's helping to redefine the term hacking, as developers and designers take a proactive approach to affecting social change with apps that aim to make a difference to people's lives. So whether people are taking over the Twitter account of the Ku Klux Klan, uncovering abuse, discovering security flaws that really ought to be fixed, or creating projects that change the way people live, there is an argument that hacking can be welcome.

"Hacking is a very important skill set in our society, because these are the experts in how the systems work and how the systems fail, says Robert Steele, CEO of Open Source Solution. "The people who use that expertise for bad are bad people. People who use that expertise for good are good people." **mm**

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A Guide To USB Hubs

Need more room for expansion? Have too many devices to plug into your PC? You'll be needing a USB hub

Ever since its arrival, the Universal Serial Bus (USB) has established itself as the industry standard connector. What started out life as a method of easily connecting computer peripherals has now spread into many more areas of technology, including gaming, mobile phones, home theatre and more. It's a connector that we see everywhere and USB cables can be found filling up people's draws of random stuff the world over.

Most computers come with a plethora of USB ports fitted as standard, especially today's modern systems that feature motherboards with multiple ports and PC cases that also house front-mounted connections. It's rare for most users to run out of space, but for some, even the most well-endowed PC doesn't have enough USB connectivity and more is needed. For others, an older PC may simply be getting full, having limited space for external expansion. There's even the possibility that users with older system lack the later, faster revisions of USB and therefore need to give their PC a little pick-me-up.

> **"It was clear that this was to be a connection that would standardise hardware connectivity"**

If this is the case, the solution that's usually turned to is the USB hub or expansion card. These devices, often external units, can add several additional USB ports to a PC by splitting one existing port into several, thereby increasing the number of USB devices that can be connected at any one time. It's a very simple system: simply plug a new hub into an already present USB port, and you'll gain however many ports your chosen hub has.

Not all USB hubs are equal, though, and if you're looking to increase your USB connectivity and aren't totally sure of what's best, you should know a few things before you buy.

We're going to take a look at this, beginning with a brief look as USB itself, how the tech has evolved and where it sits now, as this can affect your purchase too.

USB mini-B

USB Evolution

USB was first created during the mid 90s and was intended as a solution to the increasingly complex and confusing array of computer peripheral connections. Before USB arrived, people had to cope with serial and parallel ports, PS/2 connectors, game ports and other platform-specific inputs. There was no real standard for connecting hardware to a PC, and the result was a mess of different-sized ports and connectors sticking out of the back of a PC and a setup that made new computer users scratch their heads. A better option was needed, and we got one in the form of USB.

With the name Universal Serial Bus, it was clear that this was to be a connection that would standardise hardware connectivity, and so it did. It took a while, but eventually most other connectors were phased out, left in PC designs

USB micro-B

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USB-Type A

for legacy purposes only and even then, some were given their marching orders for good. PS/2 mouse and keyboard connectors were among the first to go, and soon USB ruled the roost, only challenged by the likes of FireWire, which never really had much of a chance.

USB's initial release spec of 1.0 was launched in 1996, and it boasted a speed of 1.5Mbps at low speed and 12Mbps on full speed. That's slow by today's standards, but when you consider most USB hardware of the time was nowhere near as powerful as it is today, it's not too bad. Most users only used USB for input devices and few would have ever considered using it to transfer data. That would change, however, as USB grew and grew.

'High speed' USB 2.0 was launched in 1998, and this greatly enhanced the performance of the tech with a huge increase in speed to 480Mbps. This made USB the perfect choice for external storage, even for large HDD volumes.

USB then saw a long period of inactivity in terms of development, lasting around ten years until USB 3.0 was released in 2008. This once again greatly enhanced the tech, with a speed of 5Gbps. This would go on for several years until 2013, when USB 3.1 arrived with double the speed at 10Gbps.

USB may have started out life with a goal to provide a universal plug, but even within USB this wasn't simple, and soon we were met with various kinds of USB connector. Over the years more and surfaced, many designed for specific devices leading to some propitiatory connectors and smaller designs for the mobile market.

The original Type-A connector most are familiar with is still widely used, as is the chunky Type-B, which can often be found on external hard disks and printers. Smaller models have grown in popularity, though, with the mini-B being one of the most popular and the micro-B also being seen in plenty of devices. The UC-E6 is another tiny connector, although this is classed an a non-USB proprietary model.

More recently, one of the major criticisms of USB has been addressed by the latest USB design, Type-C. This is a new reversible connector, which addresses the issues people have with the often tricky to connect, one-way older versions. Both ends of the cable are also the same, so there's no need for different ports. It's been touted as truly future-proof but will require a lot of adapters to be produced until it eventually phases out the old models, which could take a very long time.

These are the most common forms of USB, but there are many more, often proprietary models for specific devices or companies. The type used by most USB hubs is the standard, Type-A.

A common feature of USB, regardless of the generation, is its ability to supply limited power to a device. Although this is limited to low-power hardware, it does make USB cables very useful in some situations.

Hub-capped

Now you know about the various types of USB and how it's evolved, you'll have a better idea of what you're looking for as you shop for a hub. If you're looking online, you'll find all sorts of hubs available, but even today, not all will be the latest, and in some instances, you may not even want or need this.

Hubs will naturally support a different USB revision and will handle higher-speed hardware with varying degrees of efficiency. For example, you can still buy hubs that are USB 2.0, not 3.0. They're cheap and they work, but if you have hardware that supports USB 3.0, you won't get the most out of it, as the hub can't process the higher speeds. You should also note that a USB hub will only offer the advertised USB speeds if connected to the corresponding USB port on the PC. So to get USB 3.0 out of a USB 3.0 hub, it'll need to be connected to a USB 3.0 port on the PC.

"It's also important to know which USB port you're actually plugging the hub into"

USB tech is backwards compatible, though, so if you have older hardware, it won't be much of an problem. A USB 2.0 device will work perfectly well on a 3.0 hub; it just won't benefit from the increased speed the hub can provide. That said, a 3.0 device will often still work on an older 2.0 hub, but its potential speed will be bottlenecked by the hub, and the device won't perform as well as it can.

The only way you'll stumble into a genuine form of incompatibility would be to buy a hub that doesn't support Type-C connectors, and even then a simple adaptor would solve the problem. This means you'll rarely buy a device you can't use; you just may end up running at a lower level of performance than you could potentially attain.

For this reason, it's important to check the speeds of your various devices, looking for the fastest one you own (the one that supports the latest form of USB) and go with that. If you have a collection of USB 2.0 hard drives, along with a more

USB Type-B

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UC-E6

recent USB 3.0 model, ensure you buy a USB 3.0 compatible hub so you get the most out of everything. If you only have USB 2.0 hardware and don't plan to upgrade any time soon, save the money and buy a USB 2.0 hub. They're usually cheaper and you won't miss the added speed. For future-proofing, though, 3.0 could still be useful.

There are exceptions to the rule, however, as there always are. This revolves around devices that really don't benefit from the increased speed of later USB versions. Most keyboards, mice and other input devices don't need such speed, so benefit little from higher-speed USB. Storage devices, optical media and other, more powerful hardware does, so if you need a hub solely for lower-power devices, it might be overkill to use a USB 3.0 hub for them.

It's also important to know which USB port you're actually plugging the hub into, as this also affects the overall

> **"It's not uncommon for users who lack connectivity options to utilise not one, but multiple USB hub"**

performance. Plugging a USB 3.0 hub into a USB 2.0 port on the PC will only bottleneck every device attached to the hub. A lot of modern PCs will come fully fitted with uniform USB ports, so you may have a system with all 2.0 or even 3.0 ports. Many PCs, especially older models, don't do this and have a selection of speeds. For example, a PC may have USB 3.0 ports on the motherboard, but the PC case it's installed in might only have USB 2.0 ports mounted on the front. It's most common for the rear, motherboard-mounted ports to be the fastest, while front or otherwise mounted ports are generally slower. This isn't always the case, however, so it's important you check this setup on your own PC before buying or connecting a hub.

USB With Muscle

Another consideration is power. As we've mentioned, not all USB devices are powered, but this capability depends on the port it's connected to. If a USB device doesn't provide its own power via a separate power plug, it's not magically going to work without any, and this means the USB port it's connected to needs to be powered. If not, nothing will work. Standard USB can send around 5.25V of power through a port (PoweredUSB can provide more, but is usually used for specialist devices), and this also applies to USB hubs, and some devices require more than this and thus will need their own power, regardless of the USB port's ability to provide it. You can find some devices that are equipped with more than one USB plug, connecting to multiple ports in order to draw power, but they're not as common and they'll obviously take up more space – space you might need for other things.

This isn't usually a problem for USB ports mounted inside a PC, especially on the motherboard, since these are always powered. However, front-mounted hubs contained in PC cases are not always so lucky. To find out, you need to open up the case and check there's a power cable running from the hub to a power socket on the motherboard.

If you're going to be using an external hub, this is also a concern, because an unpowered hub will always need to be plugged into a USB port that provides power. For this reason, most connect such hubs to a PC's rear port, but you can do so to a front-mounted port, as long as it's powered. If you have a hub with its own power supply, though, there's no reason to worry, and the hub can be connected anywhere.

On Board Or Off?

You might only think of a USB hub as a small plastic device that plugs into your PC via USB, and that's certainly true, but expansion cards are also, technically, hubs of a sort, so it's important to remember that you don't have to stick only with the external variety.

Internal PCI expansion cards have been around for a long time, and they're one of the best ways to expand a PC's USB capability, as well as being the perfect way to add improved USB performance to a system by adding later USB revisions the system currently lacks.

For example, if you have an older PC that only has USB 1.0 or 2.0, you could buy a USB 3.0 expansion card so you can give your system the latest USB performance. It's a great upgrade for people who use a lot of USB devices, especially external hard drives and optical media. These cards are also not all that expensive and usually feature several extra USB ports, also increasing your overall connectivity.

USB Type C

Belkin Ultra Slim 4 Port USB powered hub

Internal USB cards also have power by default, as they'll connect to the motherboard, and they're usually faster and boast better performance, being fitted directly to the motherboard and using its bus, not an external USB cable. You'll also have fewer devices cluttering up your desk, which is nice.

Endless Expansion?

It's not uncommon for users who lack connectivity options to utilise not one, but multiple USB hubs, connected or 'daisy chained' together to provide even more ports for use. This is a practice actively supported by USB technology, and you can connect multiple hubs together to expand your selection of ports. Even plugging one hub into a computer's USB port is effectively daisy chaining, as the port you plugged the hub into is part of a hub itself, connected to a USB host controller within the PC.

> **"Many monitors also include a few extra USB ports within a hub that's part of the display's case"**

However, contrary to what many may think, this isn't infinite, and doing this does come with downsides. The limit for connected devices to USB, including hubs, is 127. That's a very large number, which most users certainly won't hit, but it's important to know.

The main concern regarding daisy chaining, however, is not limits in devices but speed. Although you can have so many devices connected, all of these still trace back to that single port the initial hub was connected to, meaning there's one single USB port handling all of this. Therefore, you'll have all of those devices sending and receiving data through a single USB port. This creates a bottleneck, which isn't all that noticeable with a handful of devices, but with more connections this speed will drop – a lot.

Mobilizers: High Speed 7 Ports USB 2.0 hub

A more straightforward concern comes from power. As we've mentioned, USB hubs, even if they're powered, will only provide limited power and many won't provide power at all. The more devices you have, the more power you need, and this will no doubt require a lot of power strips – not really the most efficient and practical method of expanding your PC.

More Than Just A Hub

The majority of USB hubs are the familiar box-shaped models that feature front-mounted USB ports. They're simple, but functional and suitable for most users. However, there are more types of USB hub, and some are included within other devices.

You can often find USB hubs included within PC keyboard and desk sets, and many monitors also include a few extra USB ports within a hub that's part of the display's case. In the case of the latter, it's surprising how many people neglect or don't even know that their screens have USB ports and instead spend money on an unneeded extra hub.

You'll also find USB ports on some routers and media servers. These are rarely for use as a

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hub, but instead allow the connections of items to the devices in question. However, as this often includes the ability to connect extra storage or hook up another device to your network, it's technically also a hub.

Here Are Some We Spotted Earlier

We'll finish up with a couple of sample hubs, mainly to look at the prices of them, giving you an idea of how much you need and should be paying.

Model: Belkin Ultra Slim 4 Port USB powered hub
Price: £12
This is a powered Belkin hub that features four USB 2.0 ports and is mains powered. It's simple, and if you need to connect devices than need power, it's a decent choice.

Model: Mobilizers: High Speed 7 Ports USB 2.0 hub
Price: £3
This cheap as you like hub has seven USB 2.0 ports, each with their own power switch and LED power light. It's designed mainly for mobile use and for charging devices, but it's bus powered, meaning it draws its power from the computer's USB port.

Model: Anker Ultra Slim 4-Port USB 3.0
Price: £10
This is a USB 3.0 hub that features four USB.30 ports and draws its power from the system bus. It's small and very portable. However, as it's USB 3.0, it needs to connect to a USB 3.0 port on the PC, otherwise the power is limited. For £10, it's a great way to give yourself more USB 3.0 ports.

Model: CSL Flexible USB 2.0 hub
Price: £5
Most USB hubs are solid, brick-like devices, and these are occasionally not the best fit if you need room to move. This model addresses this, and instead of four rigid ports, each is on a separate cable, which can be flexed however you like. Simple, but very useful. It's a bus-powered USB 2.0 model and has four extra ports.

> **Most USB hubs are solid, brick-like devices**

Model: D-Link DUB-H7
Price: £15
This is a more expensive hub from D-Link, but it features seven USB 2.0 ports and has the ability to function with or without external power. It also has a fast charge mode for use with chargeable devices like mobile phones and tablets.

Model: InLine Front panel hub
Price: £25
If your desktop PC doesn't already feature any front-mounted USB ports, a device like the Inline model here will be useful. This example is a 5.25" bay mount that includes a whopping 13 USB 2.0 ports. It's easy to it, and because it has an internal Molex power connector, drawing power from your system's power supply unit, it'll power most devices with no problems.

Model: Icybox IB-AC6113
Price: £70
Certainly one of the most expensive hubs you can buy, the Icybox IB-AC6113 is a full USB 3.0 hub that features 13 ports with their own LED status lights. It connects to the system using a single Type-B USB 3.0 connector, and because it's USB 3.0, it offers the full 5Gbps transfer speeds.

Although USB 3.0 hubs are more expensive than older USB standards, as you can see they're not ridiculously expensive and older models are very affordable, so there's no real reason to put up with limited USB capacity. **mm**

Icybox IB-AC6113

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SAMSUNG SSD £259.99 INC TAX

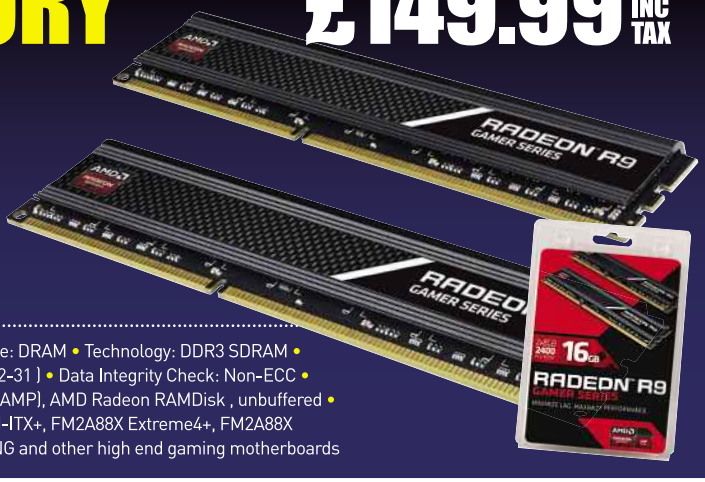
Samsung SM951 512GB M.2 NGFF PCIe Gen3 8Gb/s x4 Solid state drive SSD (2280) (MZHPV512HDGL-00000), OEM, AHCI (Sequential Read Up to 2150 MB/s and Sequential Write Up to 1500 MB/s)

The new Samsung SM951 M.2 PCIe SSD delivers a level of performance that easily surpasses the speed limit of a SATA 6Gb/s interface. With sequential data reads as high as an incredible 2,150MB/s (megabytes per second) on the 512GB model, the SM951 provides the highest possible performance available with a PCIe 3.0 interface.

- ✔ Rugged and reliable
- ✔ No moving parts
- ✔ Extreme reliability and durability
- ✔ Dependable and high performance
- ✔ SM951 M.2 format ultra high performance storage
- ✔ 9.5mm and mSATA format
- ✔ Weighs just 8g

AMD RADEON MEMORY £149.99 INC TAX

AMD Radeon R9 Gamer Series memory is optimized for the excellent AMD processor. It's built using high-quality memory chips designed to offer the ultimate gaming experience. A uniquely designed, low-profile, high-purity aluminum heat spreader provides added protection with thermal conductivity up to 165 W. The Radeon R9 Series memory modules are designed for overclocking with the support of both AMP and XMP profiles.



SPECIFICATIONS GENERAL Capacity: 16 GB : 2 x 8 GB •Upgrade Type: Generic **MEMORY** Type: DRAM • Technology: DDR3 SDRAM • Form Factor: DIMM 240-pin • Speed: 2400 MHz (PC3-19200) • Latency Timings: CL11 (11-12-12-31) • Data Integrity Check: Non-ECC • Features: Intel Extreme Memory Profiles (XMP), dual channel, AMD Memory Profile Technology (AMP), AMD Radeon RAMDisk , unbuffered • Voltage: 1.65 V **COMPATIBILITY INFORMATION** Designed For: ASRock FM2A75 Pro4+, FM2A78M-ITX+, FM2A88X Extreme4+, FM2A88X Extreme6+, FM2A88X-ITX+ ¦ Gigabyte G1.Sniper A88X, GA-F2A88XN-WIFI ¦ MSI A88X-G45 GAMING and other high end gaming motherboards

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Code With AI2

Introduction

David Briddock introduces a new Android App coding series with App Inventor 2

In December 2010, Google launched App Inventor, an interesting and innovative attempt to open up Android app development by removing the need to learn or use a traditional coding language. Instead, apps are created by snapping together colourful interlocking blocks.

However, this initial version had a number of frustrating shortcomings, so in 2011 Google handed over the code and development responsibility to a Mobile Learning team at the Massachusetts Institute of Technology (MIT).

To fix these shortcomings, MIT initiated a major upgrade. The new App Inventor 2 (AI2) is just as simple to use, yet it offers an even more powerful solution to building apps for Android smartphones and tablets.

In this series we'll discover how to use AI2 to design, code, test and deploy Android apps.

What You'll Need

It's easy to begin creating Android apps with AI2. All you'll need to get started is a PC, a web browser and a Google account. Ideally, you'll also have an Android smartphone or tablet, but even this isn't essential to design and code apps.

Being browser-based means that any Windows, Mac or Linux PC or laptop will do fine. As for the web browser itself, the best choice is Google Chrome, but Mozilla Firefox or Apple's Safari work well too.

And if you don't already have a Google account, don't worry. It's a quick and free process to sign up for a new one (**myaccount.google.com**).

Only when it comes to testing your app with an emulator or a physical Android smartphone/tablet will you need to download anything (as we'll see later).

Of course, you'll need an app idea. And there'll be plenty to get you thinking in this series. Start by roughly sketching out the app's interface design and then jot down its desired behaviour. This makes it easier to identify the AI2 components needed to bring the app to life.

Getting Started

To begin, just point your browser at **ai2.appinventor.mit.edu**, then sign in with your Google account.

Once signed in, the main AI2 web page appears. At first glance, it's a busy-looking interface crammed full of functionality, but don't worry, it's straightforward to master.

The key to AI2's rich potential is the two construction views, namely Designer and Blocks. We can switch between these views with the Designer and Blocks buttons, located on the green menu bar towards the top right of the web page.

The Designer View (see image) is used to define the app screens. Here we can set the screen properties, then drag and drop any number of components from the left-hand side Palette panel onto the screen; some of these are visual components like labels and buttons, while non-visual choices include sensors and data store options.

In the Blocks View (see image), we define the app's behaviour. It's done by dragging and dropping colour-coded, interlocking blocks onto the main coding area. These blocks are then 'snapped' together to form a program. The blocks themselves sometimes have data values, which help determine the app's behaviour.

Designer View

First let's take a closer look at the Designer View.

There are four main panels on the screen. These are, from left to right, the components Palette, screen Viewer, screen Components and selected component Properties. Lower down, there's a small panel for imported media items.

Drop a component onto the screen and it appears in the screen's component list. This process is the same for both visible and non-visible components.

You'll notice AI2's palette component collection is pretty comprehensive. In addition to the User Interface and Layout

groups, there are others that handle drawing, social messaging, on-board sensors, connectivity and data storage.

Animation blocks control drawing and image movements on a custom canvas. The media section blocks include camera control, video handling and even speech recognition or text-to-speech. Sensor elements provide access to the internal clock, accelerometer, orientation and GPS. Connectivity options include the web, Bluetooth and, if your device supports it, near field communication (NFC).

Did you notice a small circled question mark beside each component in the Palette panel? Click it to view a description of the component and a link to an online help page.

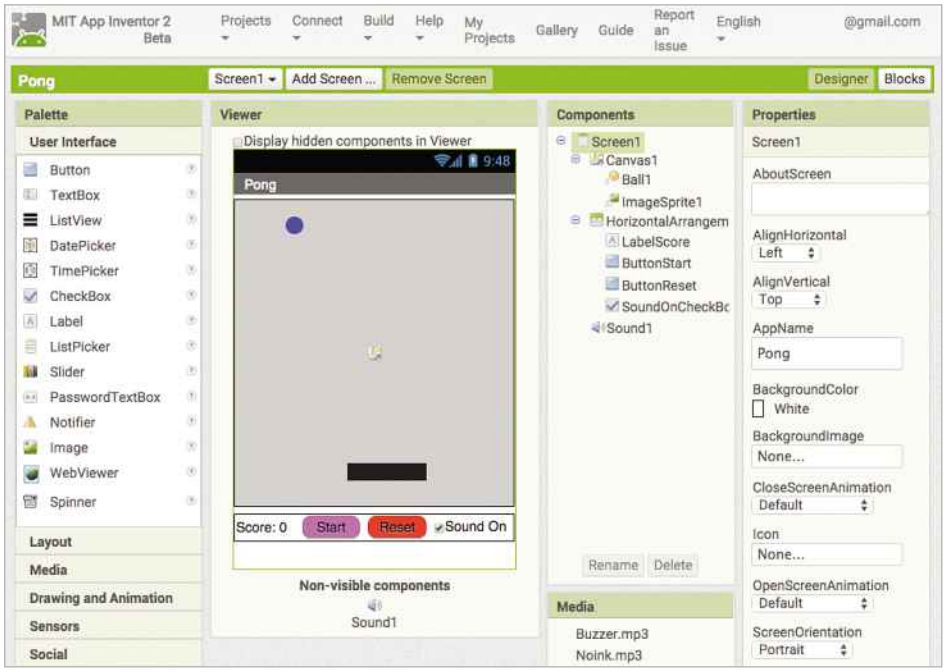
Blocks View

Once we've designed the screen, it's time to define the app's behaviour. Normally this would be done with an editor and a traditional coding language, such as C++, Java or Python, but with AI2 all we need to do is snap together coloured blocks and define some numeric or textual data.

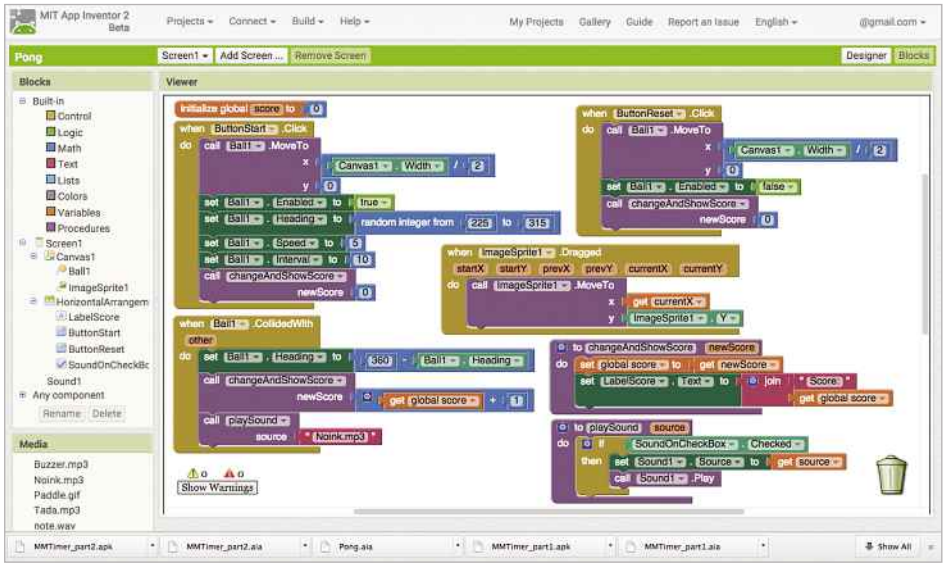
You might think this is a rather limited strategy, but in this second incarnation of App Inventor there's a large and comprehensive block collection. These blocks cover all the essential coding elements like logic, math, variables, control flow, event handling, variables and procedures.

All the generic-function blocks are contained in colour-coded groups, located in the left-hand Blocks panel. Function-specific colours help guide the eye as the number of blocks in the Viewer coding area increases. There's brown for control, green for logic, blue for math, cyan for lists, purple for procedures and so on.

However, that's not all. Other blocks, of various types, appear when you click on one of the components previously added to the screen in the design stage. And it's these component-specific blocks that really make AI2 such a friendly and flexible coding tool.



Designer View example



Blocks View example

Menus

At the top of the AI2 web page we can see the green menu bar. The most commonly used ones are on the left and include options for managing projects plus testing and building apps.

Rather than discussing these now, we'll cover them in a context-specific manner while building Android apps.

Nevertheless, it's worth having a look at the extensive help information. The Guide menu, over to the right, has a 'beginners-start-here' function, while the Help menu has more contextual help information.

What's Next

With AI2 we have everything we need to build native Android apps, which can be tested and loaded onto an Android smartphone or tablet andd even deployed onto the Google Play store as a free or paid-for app.

Starting next time, we'll build a collection of useful apps, which also have plenty of potential for further customisation. **mm**

App Inventor 2 Links

- AI2 website: ai2.appinventor.mit.edu
- AI2 installation/setup: goo.gl/4M64R7
- AI2 community: appinventor.org/appInventor2

Remembering... Nintendo GameCube

David Hayward recalls a wonderful console from the noughties

In between the Nintendo 64 and the Wii, there was, in my opinion anyway, the best Nintendo console ever released: the GameCube.

This odd looking, purple paint job, lunch box carry handle console was powered by a 500MHz PowerPC processor, had 43MB of memory and a 162MHz ATI Flipper GPU with 3MB of memory on chip. It was amazing. And with it came some of the best Nintendo based games I had ever played.

Assault, *Tales of Symphonia*, *Soul Calibur 2*, *Resident Evil 4*, *Metroid Prime* and of course *The Legend of Zelda: Wind Walker*. In fact, as soon as I'm done with this article, I'm off to plug my GameCube back in and get some gaming done.

Its History

The history of the GameCube can be traced back to 1997, when a team of former N64 engineers formed a company called ArtX. This company was to begin development of a new GPU, called Flipper, for the next generation of Nintendo consoles.

Project Dolphin, which was the GameCube, was announced in 1999, with developer units being sent out and the PR wheels being substantially greased ahead of a launch in a few years' time.

By mid 2000, ATI had acquired ArtX and continued the development of the GPU, even though it was mostly already complete. In conjunction with ATI, software developer Factor 5 had started working on the software that would work with an early motion controller prototype. However, after some difficulty in getting the software and hardware married up correctly in time for the launch of the GameCube, the motion controller was delayed until the next generation of Nintendo console, the Wii.

Despite the console being released in Japan in September 2001, selling 500,000 units on the first day, and overall selling 22 million units worldwide, the GameCube wasn't the financial success Nintendo was hoping for.

In an age where the PlayStation 2 was already reaching the 100 million mark, the poor GameCube was left on the shelves to gather dust while gamers mostly enjoyed *PES* on the PS2 or *Halo* on the Xbox. Perhaps if the N64's lifespan was shortened to get the GameCube out a little earlier, it may have had a better chance. Also, it might have done better if it wasn't seemingly aimed at younger gamers, rather than also appealing to more mature customers.

In short, it never reached its full potential. The gamers of the time had grown up through the 80s and 90s and were now after the adrenaline-fuelled combat games of the higher-specified platforms, PC included. As a result, the GameCube was quietly put to one side while work on the Wii started, with the launch in 2006.

The Good

Amazing games, great graphics and a decent controller too.

Did You Know?

- The wireless WaveBird controller is the prototype for the Wii controller, although it didn't work too well on the GC.
- In *Donkey Kong 64* (for the N64) there's an unlockable video where there are auditions for Project Dolphin (the future GameCube).
- Apparently, the GC was easy to develop on, and it was pretty cheap to make as well
- The storage format was mini discs, which only had a 1.5GB capacity, hence why many games like *GTA3* were never released – and why it had awful cut-scenes.

The Bad

Poor marketing, younger console image, dodgy laser and a carry handle that caused a dodgy laser if you put it down too hard.

Conclusion

Although it didn't quite succeed as much as Nintendo had hoped for, the GameCube has a special place in the hearts and minds of those of us who stayed up late to get through Super Smash Bros.

So for that alone, we thank you, Nintendo.

The Nintendo GameCube: what a magnificent little box it was

The motherboard of the GC, with the Flipper GPU

Rogue Leader: what else could you ask for?

How 3D-printed rats could offer schools a vegetarian dissection

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Component Watch

Component Watch

Get yourself a great deal on a second screen...

Multi-monitor support has been greatly improved over the latest versions of Windows, so adding a second screen to your system has never been an easier thing to do. Of course, the expense often outweighs the practical benefits, but you can make things a bit easier on your wallet without dramatically reducing the experience by going for a cheap monitor instead. To show you that it's possible, this week we're looking at the type of monitors you can buy for less than £100.

Deal 1: Asus VS197DE
RRP: £92.99 / Deal Price: £56.90

Monitors don't get much cheaper than the Asus VS197DE, which has recently had a dramatic price cut, presumably to clear the line for something better. Still, that makes it an excellent bargain, even though it's a fairly standard 19" monitor (1366 x 768 resolution, 5ms response time, VGA ports and nothing else), you won't be blown away. But if you want more screen space, there's little to complain about. One for home offices, perhaps?
Where to get it: Pixmania – bit.ly/1IrJHj7

Deal 2: HannsG HE195ANB
RRP: £79.99 / Deal Price: £64.98

Similarly cheap is the 18.5" HannsG HE195ANB, which is currently available for less than £62 from eBuyer. It's not exactly high-end; a 1366 x 768 pixel display, inexpensive TN-panel technology, 5ms response time and VGA-only connectivity make it a poor choice for gaming or watching movies on. Ultimately it's no better than the Asus VS197DE (despite being a little pricier), but it's a solid enough buy if you can't find that.
Where to get it: Ebuyer – bit.ly/1DlRJbu

Deal 3: Philips 196V4LAB2
RRP: £91.99 / Deal Price: £70.69

If you absolutely can't live without DVI, the 18.5" Philips 196V4LAB2 is one of the cheapest monitors around that incorporates it, but that does mean the resolution is back down to 1366 x 768. Still, this slightly more expensive monitor has additional features, such as SmartContrast, a mercury-free eco display and two built-in 2W speakers that make it a solid low-cost investment. If you can put up with the low resolution, its feature set makes it worth the money.
Where to get it: Dabs – bit.ly/1IJBzKa

Deal 4: Acer G226HQLB
RRP: £94 / Deal Price: £72.99

If you want a full HD monitor, you don't have to spend a lot more, and you get a lot more for your money too. This 21.5" screen has a resolution of 1920 x 1080, with both DVI and VGA input ports, a 5ms response time and a 160° viewing angle. That's a lot of functionality packed into a £73 monitor, and the huge discount makes it incredibly attractive to buyers, especially if you have HD films to watch.
Where to get it: Ebuyer – bit.ly/1M73skI

Deal 5: Samsung S22D300HY
RRP: £98.86 / Deal Price: £90.62

Full HD capabilities are fine, but what's the use if there's no HDMI input? The 21.5" Samsung S22D300HY solves that problem by adding one, meaning you can finally get a full package, 1080p monitor for £90. As well as Samsung's reputation for high-quality screens, this monitor also has a tilt ability that allows you to adjust its orientation – something cheaper screens often lack. A game mode, magic upscale and off timer complete the package. Objectively it's not fantastic, but at this price it feels like it is.
Where to get it: LambdaTek – bit.ly/1KSsIK3

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MtGox Chief Arrested

Watch It!

Japanese know-how shines in smartwatch

The simple days, when watches just told the time, are over. Now, smartwatches are everywhere, and Japanese manufacturer Tokyoflash has got on board the fast-moving train with the release of the Kisai Kitana Link watch.

The watch is unique for a couple of reasons. First, you follow the one katana hand to read the time, with hours shown by large markers as on a regular clock and minute markers positioned between each hour. It's a rather nice-looking affair with the custom-designed katana hand coming in polished silver and black, contrasting the spin brushed watch face.

The other unique thing about this particular release is that is comes with Kisai Link integrated into the strap, allowing you to receive phone calls, emails, SMS and social media alerts from the likes of Facebook, Twitter and WhatsApp.

Lightweight at just 115 grams and 7mm thin, the Kisai Katana Link takes a standard watch battery and this might be the perfect answer to anyone looking for something a bit swish to show off on their arm. The website for more info is over at **www.tokyoflash.com**.

> The watch is unique for a couple of reasons

Japanese authorities get their man

Police in Japan have arrested MTGox's CEO, Mark Karpeles. Regular readers will no-doubt recall that Karpeles was the main man at the defunct online bitcoin exchange)once the biggest of its kind in the world) and at the helm when the whole thing shut down and left many investors out of pocket. The reason for his arrest? Well that's all to do with him being suspected of using the exchange to transfer a cool $1m to an account he was controlling.

Media reports suggest that, rather predictably, his lawyer is issuing fervent denials on behalf of his client, but the case is obviosuly winding its way towards some kind of conclusion either way.

We'll leave you with this fact regarding the the scale of bitcoin losses that led to MtGox's demise. In value terms, the thousands and thousands of bitcoins lost amounts to around £250 in today's money, which shows how the bottom has fell out of that market. Wow.

New Cougar Mouse Roars Into Overclockers

Left- or right-handed, this one's for all

Cougar's new gaming mouse, the 250M, is now available to buy over at **www.overclockers.co.uk**. Available in black or white, this is an ambidextrous design for righties or lefties and it promises high-end gaming functionality at a decent price.

Coming with a 400dpi sensor, 1,000GHz polling rate and a 1ms response time, the mouse ensures all-but-instant response to user commands with all the precision and speed you'd expect in a gaming mouse There are six fully user-definable buttons, configurable through Cougar's UIX tool and up to three full configuration profiles can be stored in the mouse's 512KB on-board memory.

OMROM switches, we're assured, make for long-lasting accuracy as they offer a guaranteed minimum 5,000 clicks. That's just part of the package that makes this £21 mouse sound like it's worth a good look to us. Head for the website mentioned above for more details.

How much time do you spend online? A couple of hours a day? Maybe more?

And perhaps you also spend some of that time using social networks, checking out what your friends, relatives and acquaintances are up to.

That's not unusual, but as Sarah Dobbs warns us this week, it's important to know when to log off, because spending all day looking at how great everyone else is doing isn't always healthy and can ultimately lead to depression and bitterness.

That's not to say that social networks can't also be good for relationships, because it's true they can help people keep in touch, but surely we should be using them to enhance our real lives, not replace them.

It seems like an obvious thing to say, but technology can be addictive, and sometimes it's good to have someone around to tell you when you've had enough.

Until next time,

Anthony

Editor

Meanwhile... On The Internet...

There's rarely a week goes by when we don't report some issue relating to Reddit. You'll forgive our interest in it, we hope, as it serves as a example of a set of issues that are facing many of the new media phenomenons that are desperately trying to grow up a bit and make some money for all the investors that stumped up the capital that got them going (see also: Gawker).

We've spent a lot of time lately covering the issues surrounding the departures of Victoria Taylor, a popular staffer there, who was fired, causing a moderator revolt, and Ellen Pao (**tinyurl.com/MMnet75a**), who resigned in the wake of the furore. It revealed the underbelly of the ever-changing – and not always trusting – relationship the site has with its users, content creators and moderators, and the issues surrounding its attempts to rein in the influence of some of its less savoury areas. Well, this week, we're back there again.

Cast your mind back a few weeks, and you may remember we talked about the dirt-dishing undertaken by former Reddit CEO Yishan Wong, who warned users of the site that their hounding of Pao and proliferation of people seeking to cast her as a villain who wanted to kerb free speech of the site, could result in them getting something worse (**tinyurl.com/MMnet75b**). Well, that and a load of other stuff (**tinyurl.com/MMnet75c**).

A little down the line, it seems his words seem to have been more than a little prophetic, as news broke last week of further steps to limit the exposure of certain subreddits by 'quaranteening' them until people opt in (**tinyurl.com/MMnet75d**), and getting of certain others altogether (**tinyurl.com/MMnet75e**) in line with its updated content policy (**tinyurl.com/MMnet75f**).

Frankly, we'll shed very few tears (none, in fact) over their passing, and we find it hard to summon up any sort of storm-the-barricades indignation about it in a freedom of speech sense. This is not, we'd suggest, the curtailment of freedom of speech – in the same way that enforcing speed limits in certain areas is not the same as curtailing freedom of movement. We'd characterise this as 'curtailing a medium by which people can choose to be reprehensible human beings, and inviting them to be idiots elsewhere', and another reminder that the web – probably for the best – is not the free-for-all it once was... That's just our opinion, though; we'd love to hear what you think about it all in the letters page.

When you stop to think about it, it had to happen eventually... In a reverse of the oft-expressed piece of received wisdom stating that 'pr0n drives innovation in technology' by being a key early adopter, Pornhub has taken a leaf out of Netflix and Amazon Prime's books by launching a premium streaming service for adult movies (**tinyurl.com/MMnet75h**).

While Pornhub, a company owned by the same media group as several high-profile content creators in the adult industry and a master of the PR stunt, was quick to drop the "Netflix for porn" soundbite, many have pointed out that what it's offering is much closer to Spotify's 'Free alongside premium' service. The $9.99 it's asking per month will allow access to a wider range of longer, higher definition movies and remove the advertisements from the existing free content in a similar fashion to the music streaming site's model.

It's a service that will be keenly watched, but not necessarily for the reason you think. The adult industry suffers heavily through piracy and unwillingness among punters to pay for content, so Pornhub's success (or not) in converting some of its six million or so daily visitors into paying customers could set a paradigm for online content in the future.

Last week, we reported on HammerToss (**tinyurl.com/MMnet75i**), the name given to a seemingly Russian exploit method that used Twitter and data repositories like GitHub to control and remove data from compromised networks under the radar of most security measures. Well, it would appear that the Apt 29 collective credited with creating that clever process were not the only ones to have the idea (**tinyurl.com/MMnet75j**).

A group of students from Massachusetts were already working on a piece of Python script they called Sneaky Creeper (**tinyurl.com/MMnet75k**), when the story on HammerToss broke. That's a clever piece of software that works in almost exactly the same way. Indeed, it would appear that their solution is almost as, if not more, versatile. It uses the same logic of mimicking real-life behaviour to obfuscate its actions, and even allowing data to be converted to audio and uploaded to Soundcloud!

If you're the kind of person who gets a bee in their bonnet about targeted ads and being tracked online, then it could definitely be worth taking a look at the Electronic Fronter Foundation's Project Badger browser add-on (**tinyurl.com/MMnet75n**).

It's a piece of software dedicated to curtailing such activity by internet advertisers and others who would seek to track exactly what you're up to online. It is built upon the foundation of AdBlock Plus, but is geared to also block more hidden methods of tracking in response to a lack of interest in the groups Do Not Track standard from the company's Project Badger seeks to hinder. Get it from: **www.eff.org/privacybadger**.

While the internet is packed with film trivia, one fact that we'd not stumbled across until this week was that comedian Chris Farley was slated to be the voice of Shrek before his untimely death. Then we saw this footage posted to YouTube (**tinyurl.com/MMnet75l**), which allowed a little insight into just how different things could have been.

Bittersweet in its own right, certainly for fans of Farley, it seems especially poignant in a month that sees the cinema release of one of the late, great Robin Williams' last film performances: as the voice of Denis the dog, the pet of Simon Pegg in the *Monty Python* team's comedy *Absolutely Anything* (check out some of his perfomance in this NSFW clip, if you like: **tinyurl.com/MMnet75m**).

QUICK BITS... India has blocked free access to hundreds of pornographic sites, by order of the government

Caption Competition

Welcome once again to our caption competition, where you stand the chance of winning absolutely nothing, except your words in a white bubble. Let's get on with it, shall we?

- **Thomas Turnbull:** "I know I shouldn't hog all the music, but I can't help it."
- **JayCeeDee:** "Come back later, I'm listening to the soundtrack from Porky's."
- **JayCeeDee:** "21st century hog roast – the Apple's in my ears, not my snout!"
- **...JB:** "I like this track, it's a pigging row."
- **doctoryorkie:** "Poster campaign to try and save Apple's bacon."
- **doctoryorkie:** "Headphone hog."
- **BullStuff:** "Just chillin' to the sounds of the Sow Sisters..."
- **Jack Bay:** "Someone made a right pig's ear of this music."
- David Passingham: "There's snout going on here."
- **Thomas Turnbull:** "Wow! Ham radio just got a lot clearer."
- **Dan Green:** "Listening to a bit of Notorious P.I.G."

The winner this week is Thomas Turnbull, with "I may be a pig, but there ain't no crackling on this music."

To enter this week, head to the 'Other Stuff' section of our forum (**forum.micromart.co.uk**) or email us via **caption@micromart.co.uk** and say something funny (but not too rude) about the picture below.

Man Fights Drone

Man wins

A chap living in Kentucky has been arrested for shooting down a drone that he spotted flying over his garden. Media reports on the matter tell the tale of how William Meredith came to be charged with criminal mischief and wanton endangerment, which are brilliant legal terms for criminal activities if ever we heard them.

Meredith shot at the drone a few times before it crashed into woods near his home and he has been quoted regarding his reasoning: "I have a right as an American citizen to defend my property."

Privacy concerns have become a problem as drone use has increased, and this chap clearly felt that this particular one was invading his. The drone's owner wasn't happy, by all accounts, and they had an "altercation" that lead to the police being called to the scene, after which the the story reachied the press.

Baseball Match Umpired By Computer

They really ARE taking over the world!

A baseball game over in the States has been officiated by a computer. The minor-league match took place without a human umpire, instead adopting a computer to call strikes and such like. In fact, the system used – Pitchf/x – is already used for providing players and umpires with data, but this is the first time it's been used to officiate a real game.

There are a few problems with the system being used in this way, as you'd no doubt expect. Chief among them is the fact that it uses three cameras to determine a ball's position while in the air but it has to at times predict the ball's location. Bottom line is that the system will inevitably make a few errors, but then so do referees.

Whatever the ultimate outcome, this could quite possibly be another footnote in the story of how robots took over the world.

Snippets!

Conan The Joke Thief?

US TV host Conan O'Brien has had a lawsuit thrown in his direction, accusing him of stealing jokes from a Californian comedian's Twitter feed. The jokes were allegedly used in O'Brien's monologue section during various shows last year and the comedian on the other side of the lawsuit claims that he has filed copyright applications for the jokes, with copyright pending.

As he didn't receive payment or credit, he's gone after Conan whose production company states that the lawsuit has "no merit". Luckily, we have no such problems with people stealing our jokes. Who'd want to?

Google+ Not Required

The days could be numbered for Google+, as Google is dropping the need to sign up to it to log in to its products and services. Soon, you'll be able to post comments on sites such as YouTube without first requiring a Google+ account.

The news obviously opens up Google's services to a wider audience and the decision to separate Google+ appears to be some sort of confirmation that Google admits that its attempts to better integrate it with its other services hasn't been entirely successful.

The Pres Wants Power

When you're the Leader of the Free World you can ask for a lot of things, and President Obama has given an Executive Order for the US to build the world's fastest computer by 2025.

Obama wants an exabyte supercomputer capable of a quintillion calculations a second and the US is setting up something called the National Strategic Computing Initiative to get the job done. As for what the computer will be used for, a White House blog post suggests complex simulations for things such as weather and climate, molecular interactions and aircraft in flight.

No World of Warcraft, then?

14 Million Sign Up To Windows 10 In A Day

Quite a successful launch, then

You'd have to have been living under a rock for quite some time to have missed the fact that Windows 10 is now very much out in the wild. Was the launch a success? You could say that.

14 million PCs upgraded to Windows 10 on the first day of its release, further helped by the fact that anyone with a Windows 7 or 8.1 system could make the step up for free. One of the people who upgraded wrote about the experience on Reddit, which was interesting chiefly for the fact that the upgrade led to his wife viewing a slideshow of a whole load of porn images.

The man in question seems to have stored these images within his computer's My Pictures folder and as Windows 10 creates a slideshow from your My Pictures folder by default, he got rumbled. Now, this being Reddit, this could all be a ruse but it makes for a good cautionary tale nonetheless.

HitchBOT Vandalised

Sniff

A robot in America has come to a sticky end as the not-so-loving people of Philadelphia have taken him apart and left him to rust. HitchBOT, for the uninitiated, was on a mission – a mission to hitchhike across America with nothing other than people's goodwill to spur him on his way. The robot was part of a project from a research team in Canada that wanted to test whether robots could trust humans. Following the rather tragic set of events, it looks like they can't.

It took just two weeks for HitchBOT to meet with his maker and, as his battery is dead, his creators couldn't even bring him back to a decent resting place as they don't actually know where he currently is, other than 'in bits'.

In his short lifetime, HitchBOT managed to make his way from Massachusetts through Boston, Rhode Island and New York City and he might have made it all the way to San Francisco had people treated him a little nicer. HitchBOT's blog posted this sign-off: "I guess sometimes bad things happen to good robots! My trip must come to an end for now, but my love for humans will never fade."

We'll hand over to Charlton Heston to sum things up: "You maniacs! You blew it up! Damn you... Damn you all to hell!"

QUICK BITS... **Nokia has sold its Here digital mapping business to a group of German car**

Wrong Fuel App Wins Coding Comp

Ten-year-old in winning team

A team of two teenagers and a ten-year-old have created an app that will stop you from putting the wrong fuel in your car. The group of young coders took part in the Young Rewired State Festival of Code, the self-styled 'world's largest hackathon for young people'.

The finalists put their collective coding heads together for the competition in Birmingham, having previously worked on the apps at The National Museum of Computing. Coming top of the 200-ish entries was no mean feat, and the team's PUMP app uses publicly-available data to identify a vehicle's number plate when it pulls into a filling station, links to DVLA data to determine the engine and model number and then disables fuel pumps if it's the wrong fuel type. Clever.

Sony's Winning The Console War

Big profits and market share for PlayStation 4

Good times at Sony, with the firm having announced more-than-triple year-on-year profits for the second quarter, chiefly down to the frightfully-successful PlayStation 4 console.

Having sold over 25m units around the world, the PS4 is the most successful of them all and this domination has continued over the last quarter, with its 3 million units sold comparing well against the 1.4 million Xbox One and Xbox 360 units and just 470,000 units of the Wii U that Nintendo shifted over the same period.

Don't shed a tear for Nintendo, though. It too posted a profit of £43m for a similar period, which seemed to be down to good software sales and shipments of Amiibo.

Bitdefender Bit By Breach

Usernames and passwords lost after hack

Net security outfit Bitdefender has been the victim of a hack which saw some usernames and passwords of small-to-medium-sized business customers let loose.

The hacker responsible for the trouble managed to get around a component of the firm's cloud-based system and while the breach hasn't impacted on either consumers or enterprise customers, it's more than a little embarrassing when this kind of thing happens to a security firm, of all things.

The hacker claiming responsibility for this is one called DetoxRansome who then tried to diddle Bitdefender out of £15,000 to stop him from leaking the data online. Cheeky.

Virgin Media To Invest £40m In Leeds

Not so grim up North

Leeds is about to become the welcome recipient of a £40m investment from Virgin Media as the company has announced that it's going to add 80,000 homes and businesses to its ultrafast fibre broadband network at a cost of £40m.

This is obviously a significant investment and it will see the city benefit from superfast fibre with speeds up to a mighty 152Mbps. The first phase of the rollout will bring fibre to 11,000 premises in the Middleton area, but anyone else in the city (or indeed anywhere else in the country) that is keen to get it can register at **tinyurl.com/offz3qc**.

BenQ BL2711U

A professional monitor for the CAD/CAM user and digital artist

DETAILS
- **Price: ~£500**
- **Manufacturer: BenQ**
- **Website: goo.gl/F2iSpe**
- **Requirements: Windows XP+ for software, decent GPU for higher resolutions, USB 3.0**

The BenQ BL2711U is an excellent UHD monitor

There's plenty of connectivity, and the screen image is exceptional

We've had a number of BenQ gaming-specific monitors through our doors recently, so it makes a nice change to get hold of one of the company's higher-end professional models for testing. The BenQ BL2711U is a professional CAD-oriented, 27" UHD IPS LED panel with an abundance of features for those who demand the highest possible quality when working. As UHD (ultra high definition) signifies, this is a monitor that can happily handle resolutions up to 3840 x 2160 and, thanks to the AHVA (Advanced Hyper-Viewing Angle) panel, you'll get excellent 178° viewing angles and extraordinary colour and clarity through the use of 100% sRGB and Ultra-Vivid technologies.

Native contrast is 1000:1, with a dynamic contract of 20,000,000:1; and you get the same BenQ Flicker-Free Technology and Low Blue Light modes as from the gaming range of monitors. There's also the 10-level brightness adjustment, again from the gaming world, which can reveal a lot more detail in darker areas.

The list of features goes on though, with an ambient light sensor located under the panel in the centre of the bottom bezel to auto-adjust the brightness of the backlight, and an Eco-Sensor that will auto-reduce the brightness if it senses that there's user in front of the screen. Furthermore there's PiP (picture-in-picture) and PbP (picture-by-picture) modes, as well as a range of presets that offer the best possible displays for CAD/CAM, Animation, Photo and Video Editing and the aforementioned Low Blue Light mode.

Connectivity is good too, with a pair of HDMI ports (1.4 and 2.0 ports), DVI-D and DisplayPort. There's also a USB 3.0 hub with two ports on the underside of the screen around the back, and a further two USB 3.0 ports located on the side of the screen. There's a good sized cable tidy hole on the stand, and a headphone stand that pokes out of the back.

With this being a pitched-at-pros monitor, the ergonomics are generally far better than the average desktop or gaming equivalent (although the ergonomics on the BenQ XL range are quite impressive). To this end, the BL2711U has a 90° pivot, -5° to +20° tilt, 45° swivel and is height adjustable to 140mm, with a maximum distance of 150mm from the bottom of the screen to the base. Interestingly, with the Display Pilot Software installed, the display will auto-pivot when the physical screen is moved for the best view when either landscape or portrait.

The quality of the display is magnificent. The range of colours, clarity, and sharpness of the screen is by far one of the best we've ever seen. Naturally the 2K4K resolutions help with the quality of the display, but there's a deeper colour range here than we've experienced on other UHD monitors before.

This is an exceptionally capable and impressive monitor. It's ideal for CAD work, video editing or any form of digital art, and (if you want) it's also pretty impressive when playing games at the maximum resolution. First and foremost though it's a professional model, so it's fairly natural that the pricing structure is slightly different. As it stands the BenQ BL2711U costs in the region of £500, but what you get is a fantastic monitor.

mm David Hayward

An excellent UHD monitor of choice for the professional user

ModeCom FreePC

An innovative PC from ModeCom that heralds greater portability

DETAILS
- **Price: £129.99**
- **Manufacturer: ModeCom**
- **Website: tinyurl.com/nhtv535**
- **Requirements: Monitor or TV with an HDMI Port, a USB Keyboard and Mouse, Wi-fi connection for internet access**

It's not often that I get to see a truly innovative product, but this latest release from Polish company ModeCom certainly falls into that category. Basically it's a PC squeezed into what has the appearance of a large flash drive. While the name 'FreePC' is just a play on words – at a price of £130, it certainly is not free – there's no doubt that it's a remarkable feat to fit a PC into such a small space, (11.0 x 3.8 x 1.0cm), but let's firstly have a look at the PC itself.

The ModeCom FreePC is an Intel Atom based machine, with a Bay Trail-CR Z3735F Quad Core processor running at 1.33GHz. It has integrated Intel HD graphics, supporting upto a full 1080p display via an onboard HDMI port. The unit has 2GB of on-board DDR3 RAM, 16GB of on-board storage (more on that later), in built wi-fi and low energy Bluetooth 4.0. Other ports on board include a standard USB 2, mini-USB 2 and a further mini-USB 2 for the power input; there's also a MicroSDHC for further storage that supports cards upto 64GB.

The unit is supplied with a pre-installed version of Windows 8.1 and a month's trial of Office 365 Personal; it also has a typical range of Windows Apps installed.

After the initial setup you arrive at the familiar Windows 8.1 interface

Although it's pre-installed, Windows still has to be setup in the normal way. So you have to through the usual personal data and of course set up your wi-fi, which requires that you have a Microsoft Account. If you don't, (as I didn't) you have to register one before you can finish the setup procedure. This then requires verification from another machine, which could be a potential problem for users without one; however once completed you'll arrive at the familiar Windows 8.1 desktop. Initially you have to set it up with wired keyboard and mouse but after that you can use Bluetooth equipment, which will free up the USB ports.

At this point I have to say it's a pretty impressive piece of kit. It's very slick to use, in fact it has a surprising turn of speed and is not the least bit sluggish. Of course I've only used the installed apps so I don't know how it would perform with more processor hugging applications. However, given the performance it seems capable of, I don't see that being a problem.

What could be a potential problem though is the on board storage space. Although it's advertised as 16GB the OS only recognises 10GB, which equates to 9.29GB of useable space; and of that once Windows is setup you'll find you only have 4.38GB left. So advertising this as "High-capacity 16GB Flash disk for your favourite multimedia files" is a bit misleading. However the facility to install a 64GB Mini SD Card will overcome this deficiency.

While it's a novel device, it can't be considered a standalone product. Like any other PC you'll need a keyboard, mouse, screen and a power source in order to use it. So unless you cart these items along, you couldn't use it while travelling, or in your hotel room for example. In these cases a standard Windows phone, tablet or netbook/laptop would be a better proposition, because they're obviously self-contained.

Having said that, for someone who doesn't own a PC, but has a TV with HDMI connectivity; the ModeCom PC could allow them to get online and possibly form the basis for a multimedia hub. Also it would be easy for IT technicians to carry one around so they could connect to different workstations in a networking environment; giving them instant on site access to their own programs and utilities.

Another point worth mentioning in closing is that the unit gets very hot when it's used for more than a couple of hours. However it didn't have any affect during the review period, so perhaps that's its normal operating temperature.

mm Joe Lavery

A very nice little gadget, but not all that practical for serious users

Vodafone Tab Prime 6

Mark discovers that Vodafone's new small tablet is something of an enigma

DETAILS
- **Price: £150 PAYG or Free under contract**
- **Manufacturer: Vodaphone**
- **Website: http://www.vodafone.co.uk/shop/tablets-and-dongles/vodafone-tab-prime-6/**

I'll start this review by clarifying that while this product is called the Vodafone Tab Prime 6, it's not a 6" tablet, but a 9.6" one.

For £150 (PAYG), my immediate reaction to this is that, like its Prime 6 phone brothers, this device offers a curious combination of the very latest technology, and some less concurrent abilities.

Being Vodafone branded, its primary objective is to sell a 3G/4G connection, and predictably the Tab Prime 6 includes a SIM card slot and 4G LTE electronics. Vodafone are offering a 4G connection plan for as little as £17 a month for 1GB reducing the cost of the tablet to just £19.

My only concern about SIM cards in tablets generally is that you're paying through the nose for being too lazy to configure tethering. Though, if you're using the tablet as a navigation device for example, I'd accept that it's very convenient to have a SIM installed.

As tablets go, this one is definitely built to a price. Yet it feels slim and light to handle, imitating more expensive options. However, there are things on here that wouldn't make it through to production models on more expensive brands.

For example: the glossy smoothness of the back is abruptly interrupted by the rear camera lens, which stands at least 1mm proud. This virtually guarantees that it will take any underside abuse going. Also, on the rear, I noticed four spring-loaded Pogo pin connectors, though the standard Vodafone charger doesn't use them, and I don't see any accessories that will make use of them either.

The rest of the exterior is pretty much as you might expect. If provides the usual collection of Micro-B USB port, audio jack, and volume/power buttons. There is no HDMI out, though you do get IR, should you want to use the device as a remote control.

Specifications

Screen: 9.6" IPS Capacitive (1280 x 800 pixels)
Cameras: 5MP Rear, 2MP Front Facing
Platform (OS): Android Lollipop 5.0
Chipset: MSM8916, Quad-core 1.2GHz
Memory: 1GB RAM / 16GB ROM
Supports microSD up to 32GB
Battery Capacity: 4600 mAh
Networks: GSM/EDGE/3G/4G/HSPA+/LTE
Features: Wi-Fi 802.11 Dual band a/b/g/n, Bluetooth 4.1, Micro USB 2.0 high speed, GPS, IR
Dimensions: 244x146x7.99mm
Weight: 406g
Box content: Quick guide 5V/2A Charger USB cable

Quite plainly, the Tab Prime 6 was an exercise in cost cutting, plotting a fine line between delivering sufficient performance against total cost of build. The most significant cost corners cut were in the choice of processor, a standard memory of that is a measly 8GB, and an entry level display specification.

On paper, a quad-core 1.2GHz sounds impressive, but the Qualcomm Snapdragon 410 (MSM8916) was really made for phones I'd contest. While fine for *Angry Birds*, compared with other cheap tablets like the Intel Atom quad-cored Tesco Hudl 2 for example, it's not going to win any benchmark races.

Put simply, the 8GB of storage isn't enough; this can be addressed using the MicroSD slot to augment that amount with an extra 32GB. However, the part that probably disappoints

the most is the screen – an IPS technology panel with just a 1280 x 800 resolution. In this reviewer's experience, IPS usually offers more colour punch and contrast than this, and with the competition featuring 1920 x 1080 resolution, it's also not ideal for reading the small text common to web pages. I should also mention that it's got two cameras, but only to say that I'd not recommend attempting to build a photography collection using either of them.

On a more positive note, compared with the Vodafone branded phones, the Tab Prime 6 is spared an excessive amount of pre-loaded apps. The pre-installed Lollipop Android 5.0.2 distro is a reasonably clean example, and generally a delight to use. Battery life is also rather good, but that might be more to do with the low demands of the CPU than the efficiency of the Tab Prime 6.

It's fair to say that I'm confused by this device. It offers middle-order tablet specs combined with 4G LTE technology, but for the same money you can buy an ASUS Transformer Pad 10.1. It does have the very latest Android Lollipop on it, but that's hardly enough to justify this price – especially when Tesco's selling the Hudl 2 £99 (the same money you'll pay for Lenovo's the TAB S8). I'd wager that it's going to be an uphill struggle to convince people that this is a competitive deal.

The lower end of the small tablet market is an especially price-aggressive segment, where margins are exceptionally thin. Even as little as year ago people might how been wowed with the Tab Prime 6, but that's a relative millennium given the pace of development in the tablet space. If it was priced at £125 I'd be kinder, and at £100 the Tab Prime 6 would be something of a bargain – but it isn't, so it certainly isn't.

mm Mark Pickavance

A Lollipop tablet that's more about selling Vodafone airtime

Auslogics BoostSpeed 8

Keep your computer running like a Swiss watch with this latest product from Auslogics

DETAILS
- **Price: £25**
- **Manufacturer: Auslogics**
- **Website: www.auslogics.com**
- **Requirements: Windows 10, 8/8.1 (32- and 64-bit), Win 7 (32- and 64-bit), Vista SP2/ XP SP3 (32-bit only) 60MB hard drive space, 512MB RAM, 1024 x 700 Screen Resolution or better**

The main menu screen, after the initial scan

It's been my experience that the majority of computer users never carry out any essential maintenance on their machines. Naturally most will have a virus killer; there's been enough scare mongering to ensure that these days such a utility is almost mandatory. Yet they will merrily stand by while their machines get slower and slower for the sake of a little maintenance. Of course I realise that not everyone has the knowledge or perhaps the courage to attempt this anyway. However, there are products out there that are quite capable of doing the job for you, this latest release from Auslogics being a likely candidate.

BoostSpeed 8 is pretty all-encompassing. It covers all the essential areas that help to keep your computer running efficiently. While there is no software that can act as a substitute for more RAM, or a faster hard drive and CPU, if your machine is beginning to show the typical symptoms of getting clogged up – like a slow start-up and closedown, or the drive light continually flashing – it's likely that it will feel some benefit from the procedures this suite of applications can perform.

After installation BoostSpeed 8 will carry out an initial diagnosis of your system, highlighting areas that need attention. I thought I was pretty good at this, because I carry out my own cleanup at least once a week. Yet the program managed to find over 1GB of junk files on my system. It also found 408 issues regarding the system stability and 184 issues that affect the overall speed of the machine. What I particularly like about BoostSpeed is that you have the facility to check what it intends to do; you can also get a full report on the results after the cleanup is completed.

Once the initial diagnostics are resolved, you'll see small red circles with exclamation marks alongside the other areas that need your attention. In my case this included the removal of tracking cookies, and other profile data (some 41,000 instances, in fact...) so much for my DIY cleanup approach!

It also had warnings on Live Speedup, to show that Auto Defragmentation, Disk Priority and Desktop Crash Prevention were disabled. To fix this issue you simply click on the enable button. As my boot drive is an SSD I did not enable Auto Defrag, which could drastically reduce its life – although to be honest I imagine the Auslogics programmers will be well aware of that. The Action Centre was also flagged, yet this is simply an advert for more Auslogics products.

The last two options on the menu are firstly Brower Care, which displays all the add-ons and toolbars currently installed in whatever browsers you might have on your machine. Here you to easily get rid of any you don't want, and set your preferred home page as well. The last option is All Tools, which is basically a list of all the tools you could possible need for maintain your system; it includes things like, File Recovery, Disk Explorer, Duplicate File Finder, Registry Cleaner, Uninstall Manager and more.

As you can see quite a comprehensive package, which I have to grudgingly admit produced far better results than I could have on my own. In fact it's not that long ago that I reviewed a similar product from another company, which initially showed great promise. But after completing its cleanup of my cached files none of the links in my browser worked and all my saved passwords had vanished. This time before letting BoostSpeed loose I took the trouble to save this data first. As it happens I needn't have bothered, after doing its thing and recovering over 1 GB of drive space, all my links and passwords were still intact. Also Boost Speed 8 has its own recover option that creates a backup, so you can roll back any changes made if you have any issues.

mm Joe Lavery

An easy to use utility that does exactly what it says on the box.

Corsair Raptor K30

A raptor that isn't going to try and cut you open and eat your insides while your still alive

DETAILS
- Price: ~£40
- Manufacturer: Corsair
- Website: goo.gl/zv0jX9
- Requirements: Spare USB 2.0 port, Windows XP+ for software, works on Linux and Mac

The Corsair Raptor feels mechanical, but it's actually rubber dome keys

There are a couple of minor issues, but overall it's a good keyboard

The Corsair Raptor is coming up for being a couple of years old now, ever since Corsair purchased the Raptor Gaming name and products. However, it has proved itself as one of the more popular keyboard choices for both gamers and those who require a quality keyboard for long hours in front of the monitor.

The reasons for its popularity are simple enough. For starters, there's a decent amount of features on offer: adjustable backlighting behind every keycap, six programmable 'G-key' macros and three 'M-key' profiles (for 18 possible customised presets), anti-ghosting, multimedia controls and a satisfying keystroke that ends with a mechanical-like Cherry Blue click.

The K30 isn't a mechanical keyboard, though, it uses rubber dome keys. However, in all honesty, unless you had a mechanical keyboard sat next to you it's hard to notice the difference. The keystrokes are accurate, well-spaced and offer a fluid travel across the board with very few mistypes. The G-Keys are located separately to the left of the QWERTY section, but not too far from the positioning of your hands so they can't be quickly accessed while gaming. The same goes for the M-Keys, arranged in a short strip along the upper left of the keyboard.

It's also a reasonably priced keyboard, being pitched at around £40 depending on where you shop. It's fair to say that even mechanical keyboards can be bought for less than that these days, but there's often some missing element such as backlighting, macros or something else that leaves you missing something you get with this setup.

It does have some niggles, though, although nothing too drastic or terrible. The media keys – play, stop, pause and so on – are located just above the number pad as a long thin strip recessed and close to the surface of the board. While generally fine, from the normal typing position they can be a little tricky to get to without hitting the upper keys of the number pad. Also, despite having four rubber feet on the bottom of the keyboard, there's no rubber on the extended feet, so the keyboard can skitter around the desk with very little effort.

As we said, however, these are very minor issues, and with the K30 sat in front of you you'll quickly find a comfortable position and will hardly notice any of the above at all.

Speaking of comfort, the K30 has a very natural feel. It usually takes a bit of time to get used to how a keyboard performs, but not so much with the K30. Whether it's the slight travel in the keys, or the size and spacing of the keycaps and QWERTY board we're not sure; it just 'feels' easy to get on with and use.

We were quite impressed with the Corsair Raptor K30. It's one of the better gaming and everyday keyboards we've used in a long time, and it manages this with very little fuss or over the top features and style.

There are certainly more capable keyboards out there, and more aesthetically pleasing ones too. The K30, though, is solid, dependable, reasonably cheap, and works well out of the box. A good keyboard for the money.

mm David Hayward

A good choice of keyboard for gamers and non-gamers alike

MyGica ATV585 Android TV Box

Android magic from this tiny media box

DETAILS
- **Price: ~£70**
- **Manufacturer: MyGica**
- **Website: goo.gl/NnZ8dd**
- **Requirements: Google account for Android apps and Play Store, spare HDMI port**

Over the last year or so we've seen so many tiny Android-based under the TV boxes, with each offering the many benefits associated with the Google Play Store within such a discrete sized media centre.

With so much competition around and to stand out from the crowd then, the manufacturer needs to be able to pull something special out the hat to pique the interest of the consumer. This latest under the TV box from MyGica looks interesting, but does it have the white rabbit ready to wow the audience?

The MyGica ATV585 has a Cortex-A5 quad-core, 1.5GHz processor with a Mali-450 quad-core GPU and 1GB of memory. The built-in 8GB eMMC flash storage has Android 4.4 installed out of the box, together with KODI (formerly XBMC), Chrome and a number of other apps.

There are a pair of USB 2.0 ports located to one side, with an SD card slot, while the rear of the ATV585 houses a HDMI port, 100Mb/s Ethernet, power, swivel antenna, and micro-AV. Three small LEDs on the front of the device indicate a connection to the network through the Ethernet port, and the status and power of the device.

Furthermore, the ATV585 has 802.11 b/g/n wi-fi, Bluetooth 4.0, and an IR strip for use with the accompanying remote. Speaking of which, the remote is surprisingly good in this case; we often come across Android media boxes with really terrible remotes, however the ATV585's example has solid buttons, a separate section for pairing with the TV, and buttons for Android specific functions such as home, back, and menu. Additionally you'll also find four quick-link buttons at the bottom for Netflix, Android settings, Play Store and KODI.

The MyGica ATV585 Android TV Box is a pretty decent little device

The ATV585 is certainly a quick little Android box. The apps load fast, and movement between already launched apps is fluid and without the usual stutter you normally see on these kinds of devices. Playback of video, from either an online source or from a local NAS drive or USB storage is also as near perfect as you could wish for.

> **"The apps load fast, and movement between already launched apps is fluid"**

There are a couple of niggles that let it down, though. For one, the IR sensor seems to be a bit picky at the angle it chooses to work at. With a straight view it works fine, but if you move slightly to one side or the other it tends to fail. Secondly, playback is limited to 1080p, there's no 4K support – although H.265/HEVC hardware decoding is present.

There's plenty going for it, but this is a tough market to start in

While bemoaning the lack of 4K support may seem a little unfair, since most of us are still only just getting used to 1080p HD, it is something that separates the excellent Android boxes from the more mediocre ones. Take for instance the Minix NEO X8-H, with H.265/HEVC hardware decoding this is an example that's ready as a 4K Android media hub – and it has a slightly more powerful CPU and GPU too, as well as an air-mouse remote.

The MyGica ATV585 is a good little Android media centre. There's plenty to please the user, and it's reasonably priced too. It lacks some of the more alluring features the competition has on offer, however, which is a shame.

mm David Hayward

A good Android-based media device

Submerged

Explore the hidden secrets of this post-apocalyptic water world

DETAILS
- **Price: ~£20**
- **Manufacturer: Uppercut Games**
- **Website: goo.gl/U4hF00**
- **Requirements: Windows 7+, 4GB RAM, dual core 2GHz+ CPU, GeForce 9800GTX+ or Radeon HD4770+**

The wonderful environment of Submerged

Exploration and discovery is the name of the game

Find your way around the building, climb and discover new areas

Every so often a game comes around that's a little different from the norm. It could differ in a variety of ways and offer the gamer something other than simply mashing the fire key, or racking up the points in a never ending quest to subdue the enemy.

Submerged, from Uppercut Games, is such a title. It tells the story of a young girl, Miku, who has fled from violence and brought her injured brother, Taku, to a strange desolated and flooded city. In this post-apocalyptic setting, where the seas have risen and consumed most of the land, Miku must explore in order to find vital supplies to help bring her young brother back to health. All is not quite as it seems, though.

Submerged sees you in control of Miku in a third person setting. You can navigate the city via your motor boat, weaving in and out of the moss and lichen covered towering remains of skyscrapers, while locating points to moor and explore on foot. It's here that game takes on a Lara Croft/*Last Guardian* feel to it, as Miku can nimbly climb her way and scramble up the sides of the buildings in a series of navigational puzzles. One route could lead to the top of the structure, and possibly to reveal one of the ten hidden supply crates that contain the necessary medicines, food, clean water and other items to bring Taku around and bind his wounds. Other routes, though, lead off the main course, and in turn guide you to hidden locations that contain information in the form of journal entries regarding the world and how it entered the state it's in now.

As well as the tale of the world, the journal entries include the story of the two siblings, along with a collection of the weird and wonderful creatures you'll come across and any notable landmarks. These last instances are for the explorers, with extra credit for finding all entries and landmarks coming from Steam Achievements.

There's plenty to see within the waterlogged world. A handy map can be opened to help you track your location and points of interest. You also have a telescope that can pinpoint locations where a supply crates or journal entries are located – or one of the many upturned boats that can be dismantled to upgrade your own and allow for a boost for a short while.

Submerged is all about the story; there's no combat, violence or death. You can't fall from the top of a crane and plunge to your doom, nor can you dive into the water below, which would have been a nice addition. The pace is set to your own preference, meaning that you don't have complete the game within a certain timescale; you can enjoy the exploration without fear of your brother coming a cropper while you're away. The game mechanics work well. There are a few moments where, graphically, the setting is marred by odd camera angles, but these are few and far between. Other times it works well, and adds a sense of scale to the environment.

This is a beautiful game, and the accompanying score is both serene and tense, greatly enhancing the day, night, and weather effects that you'll encounter while exploring every corner of the city.

This is a quite wonderful and enjoyable title to play. It's different, well thought out and developed. mm **David Hayward**

Beautifully crafted, with exploration and navigation puzzles galore

micro mart
9 Quality
8 Value
8 Overall

GROUP TEST

16GB DDR3 RAM Kits

It wasn't that long ago that 4GB of system memory seemed like a lot. Nowadays, though, we've broken past the 8GB is enough barrier and are staring at 16GB kits for our next system build.

David Hayward has a look at six potential kits for sale and sees which are worth seriously considering.

16GB DDR3 RAM Kits

Corsair Vengeance Pro Red

DETAILS
- **Price: £100**
- **Manufacturer: Corsair**
- **Website: goo.gl/ITeH4X**
- **Requirements: Two DDR3 slots available, 1.65V**

The Corsair Vengeance Pro Red is an impressive looking RAM kit

Corsair has proved itself as one of the leaders of high-quality memory, designed for professional system builders and enthusiasts alike, while offering superb stability and overclocking potential. It's managed to retain that crown for quite some time now, mostly thanks to the Vengeance Pro range that was released a couple of years ago.

Designed to work with third- and fourth-generation Intel processors, the Pro kits are available in a range of capacities and speeds. From an entry point of 1600MHz through to 2800MHz and available in an assortment of colours, the Vengeance Pro pretty much has something for everyone.

The 16GB kit we're looking at in this instance is the 2x 8GB DDR3 2400MHz Red version, product code CMY16GX3M2A2400C11R. This is a newer batch of RAM kits, and while the older 2400MHz Vengeance Pro had latencies of 10-12-12-31, this newer version uses 11-13-13-31, with the voltage remaining the same at 1.65V.

With good performance and overclocking potential, it's one to look out for

The Red title is purely for show, it being the colour of the top of the heatsink. While that doesn't have any bearing on how well the memory performs, it is available in blue, silver and gold, so it can match your LED setup, motherboard or whatever else you've installed in your PC.

In terms of overclocking potential, we managed to tune the speed up to a tad over 2500MHz on our motherboard, with everything remaining perfectly stable. We imagine that with a better motherboard in place you could tweak it further (2600MHz and beyond most likely), but as we didn't have anything available, we had to make do with our current setup. Interestingly, the eight-layer PCB of the Vengeance Pro has been designed specifically with overclocking in mind, reducing electrical noise and allowing great optimisation and timings. In short, overclockers will enjoy fiddling around with the Pro kits to their hearts' content.

The height of the sticks are 44.5mm, which although are somewhat big aren't the tallest RAM sticks we've ever come across. Generally speaking, you shouldn't have too much difficulty with the majority of large CPU coolers, but as always it's best to measure up the clearance before you commit to buying anything.

We used SiSoft Sandra for the memory benchmark, recording a good 31GB/s when not overclocked and managing 34GB/s when overclocked to 2525MHz. How those numbers fare in real world computing terms depends on the rest of your setup. Our gaming tests ran perfectly well, even *Batman: Arkham Knight*.

The only thing we didn't like about the Vengeance Pro was the fact that the red-coloured aluminium strip on top of the heatsink could be unclipped rather too easily. If you remove the stick from the motherboard without taking care, the clip can come off and perhaps get wedged under the board or dropped or something. It's unlikely but worth noting.

Overall, we were impressed with the Corsair Vengeance Pro 16GB kit. It's priced at around £100 and offers great performance and good overclocking potential.

Crucial Ballistix Sport

DETAILS
- Price: £70
- Manufacturer: Crucial
- Website: goo.gl/BEQrUJ
- Requirements: Two DDR3 slots available, 1.5V

▲ *The Crucial Ballistix Sport offer decent performance for the price*

➤ *They're not as tall too, so fit more setups easier*

The Crucial Ballistix range is deigned purely for gaming or other such data intensive task.

There are a range of kits available, but this time we have the 16GB DDR3 PC3-12800 1600MHz kit on test, product code BLS2CP8G3D1609DS 1S00CEU, priced at roughly £70 (although you could probably find the kit a little cheaper depending on where you shop).

Crucial has greatly improved the quality of its RAM over the years, and as a result the current batch of Ballistix, in this case the Sport range, has an impressive list of technical specifications and manufacturing processes after its name. Just to note, the Sport range we have here is designed for standard desktops, whereas the Sport VL has a low-profile design, Sport XT is much bigger and a little faster for gaming builds, and the Sport SODIMM is naturally made for laptops or other ultra-compact systems.

The Ballistix Sport runs at 1.5V, has a latency of 9-9-9-24 and a clock speed of 1600MHz. It's a mid-range pair of 8GB sticks and, as such, it won't perform quite as well as the Corsair Vengeance kit, but it's also a little more compatible in both terms of specifications and dimensions.

The sticks measure around 31.5mm in height, which is far more manageable than the previous Corsair example we looked at. Needless to say, then, the Crucial Ballistix Sport is more compatible with larger and intrusive heatsinks.

> **"The Crucial Ballistix Sport is more compatible with larger and intrusive heatsinks"**

As for overlocking, unfortunately in this instance we didn't have much luck. Whether it was simply a combination of our motherboard and the memory or the memory itself we're not entirely sure. However, we did try to up the clock speed slowly, but it failed at every point other than the default auto setting.

The benchmark for the Ballistix Sport managed a decent 23GB/s – not bad for 1600MHz memory, considering the general average seems to be around 20 to 21GB/s for this type of memory.

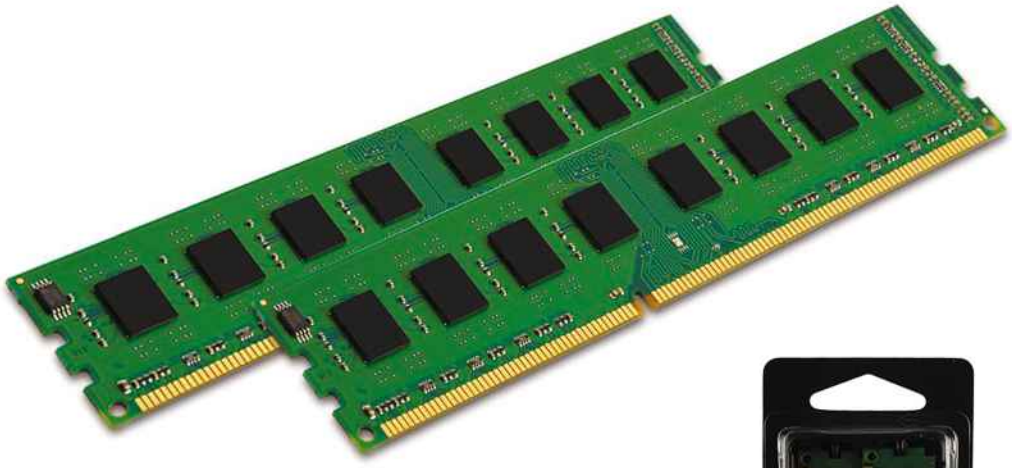
In terms of real-world computing, we did see some slowdown on the games we were testing, although only on the newer games. The likes of *Assassin's Creed IV* worked just as well with this 16GB kit as it did with the more expensive Corsair entry. *Batman: Arkham Knight* and *Submerged*, though, did seems to stutter slightly when delivering more intensive scenes.

The Crucial Ballistix Sport 16GB kit is actually pretty good. The Ballistic Sport XT is probably the modern gamer's choice of memory at 1866MHz, although it's less compatible due to its size. And in all honesty, more advanced motherboard owners will probably opt for the Sport DDR4 RAM kit.

Nevertheless, the Ballistix Sport is perfectly capable and a little easier to accommodate than bigger RAM sticks. Plus it's a tad cheaper too.

Kingston ValueRAM 16GB Kit

DETAILS
- **Price: £65**
- **Manufacturer: Kingston**
- **Website: goo.gl/PFACyB**
- **Requirements: Two DDR3 slots available, 1.5V**



▲ *The Kingston ValueRAM may not look like much, but it'll suffice for most users*

➤ *You won't get great performance, but if all you're after is capacity, then it'll do*

We couldn't have a RAM group test without a mention for the ever faithful Kingston ValueRAM. KVR has been knocking around for years, provided a decent backbone for desktops at a reasonable price. But times change, so can ValueRAM once more prove its value?

Cheesy openings aside, the Kingston ValueRAM we have on test here is the pair of 8GB DDR3 PC3-12800, 1600MHz sticks, product number KVR16N11K2/16 and priced at around £65. The timings/latency for these sticks is 11-11-11-28 with a low voltage of 1.5V.

The sticks themselves look fairly uninspiring. There's no externally mounted cooler or Kingston logo fitted to an aluminium front – just a sticker on the chips. Not that any of that will have an effect on the performance or how the memory works, but it's worth noting that due to the lack of a heatsink, overclocking or pushing the RAM beyond its limits is out of the question.

However, despite the lack of visual appeal, the Kingston ValueRAM measures just 30mm from the base of the PCB to the top. This means that it'll fit virtually any system and is low profile enough for even the most aggressively intrusive CPU cooler.

The benchmarks didn't fare too well. SiSoft Sandra recorded 20GB/s, which is the lowest so far in the group. In real-world terms, this means you'll more than likely come across some bandwidth issues when playing the latest games or running through some memory intensive programs. Our basic gaming tests, since games use huge amount of memory bandwidth, had issues with the likes of *Batman: Arkham Knight*, *Submerged* and *Elite: Dangerous*. The older titles we tried, *Assassin's Creed IV* and *Civ 4*, didn't have any noticeable problems, though. Basically, if you're not looking to play the latest games but you still favour some of the older titles, the Kingston ValueRAM will be enough to handle the numbers – provided the rest of your system is up to scratch, of course.

> **"If you're on a tight budget, then the Kingston ValueRAM will suffice"**

It makes you wonder though how much value the Kingston ValueRAM really is these days. As we said at the beginning, this pack is only five pounds cheaper than the better performing Crucial Ballistix Sport and only £35 cheaper overall than the Corsair Vengeance Pro Red. So while still the cheapest RAM so far in the group, you'll get more memory value by spending slightly more.

It is a good kit, though, and if you're on a tight budget, then the Kington ValueRAM will suffice and offer you a good chunk of 16GB without any fitting hassles or other configuration headaches.

It's a slightly cheaper option using the Kington ValueRAM. You'll more than likely find the 16GB kit inside a cheaper priced pre-built desktop, so if you're after a little more performance, then you'll need to scrutinise the small print and see what make/model of RAM is being used.

Kingston HyperX Savage 16GB Kit

DETAILS
- **Price: £99/£69**
- **Manufacturer: Kingston/HyperX**
- **Website: goo.gl/Hx6G1O**
- **Requirements: Two DDR3 slots available, 1.65V**

The HyperX Savage is a great performer and, if you shop around, it can be relatively cheap

Two of these in your system, and you're in for a treat

Our second Kingston entry of the group is of the better performing and subsequently more alluring HyperX range.

The HyperX range consists of the Fury, Savage (which we're reviewing here), Predator and Impact. The Fury is the entry-level HyperX memory, with Savage taking the mid-range spot, before the extreme DDR3/4 Predator steps in. The Impact is the mobile and small platform SODIMM version, lying somewhere between the Savage and the Predator desktop equivalents.

The HyperX Savage kit we have comes in the form of a pair of 8GB sticks at 2400MHz, with timings of 11-13-14-32 and a voltage of 1.65V, product number HX324C11SRK2/16. There are various speeds available, from 1600MHz and up to this 2400MHz version, the top of the line.

The design of the RAM is quite impressive. Rather than opting for a taller heatsink, Kingston decided on a large red (we're not sure if other colours exist) aluminium heatspreader, with a toothed saw-like ventilation section mid-way across the top. Surprisingly, even with this heatspreader taken into account, the height of each individual stick is only 333.mm. This means there's plenty of room for fitting more elaborate CPU coolers. In fact, it's only 3.3mm taller than the Kingston ValueRAM.

A lot of thought clearly went into the looks of the memory, so showcase system builders or simply those who like to have matching LEDs and other components will be happy. We particularly liked the black PCB under the red aluminium heatsink; it's a good effect and one which we think makes a difference for those building a new system.

While the RAM looks nice, the important factors are the performance and the price. The price we'll get to in a moment, but the performance is certainly worth considering first. The SiSoft Sandra benchmark we ran recorded 33GB/s with the default settings. After playing around with overclocking, we managed to tweak the HyperX Savage pair to a decent 2535MHz, which upped the benchmark score to 37GB/s.

Admittedly, though, we didn't feel all that comfortable with the overclock, because after just ten minutes you feel the heat from the RAM a few inches away from them, so we dropped everything back to its default setting. It's fair enough; 2400MHz at 1.65V is already enough.

As you can assume, then, whereas the lesser performing memory managed to play older ganes well and newer ones with a certain degree of success too, the HyperX Savage played and ran everything perfectly.

As we mentioned, the second most important factor is the pricing. After searching we came across quite different pricing levels. For example, we found this kit for £99 from Box.co.uk, but it was only £69.99 from Dabs. We can't say if the cheaper price will stay that way, but it's worth checking around before committing to a purchase.

Overall, the Kingston HyperX Savage is a great performing 16GB RAM kit. There's overclocking potential here, as well as some attractive pricing if you can search for a deal.

16GB DDR3 RAM Kits

G.Skill TridentX

DETAILS
- **Price: £120**
- **Manufacturer: G.Skill**
- **Website: goo.gl/kwtNxR**
- **Requirements: Two DDR3 slots available, 1.65V**

The G.Skill TridentX, a worthy memory kit for gaming PCs

However, it's expensive and there are better options around

Although the likes of Crucial and Corsair seem to dominate the memory market, there are some other notable manufacturers worth paying attention to. G.Skill, of course, is among them; it does an incredible job of keeping its products in the same league as the more popular companies', but to do so it offers a little more than usual.

The G.Skill line of memory ranges from the entry-level Value brand, through the Trident, Pi, Performance, Ares, Sniper, RipJaws and finally to the model we have on test, the top-of-the range TridentX. As you can imagine, what's on offer here is a performance lover's dream come true.

The 16GB kit consists of a pair of 8GB DDR3 PC3-19200, 2400MHz sticks, with a latency of 10-12-12-31 and running at 1.65V. The average price puts this kit at around £120, making it the most expensive one in the group test, but you can search the product number F3-2400C10D-16GTX to see if there are any deals currently on offer.

These are quite impressive looking memory sticks. The TridentX logo is printed on a red and black aluminium heatspreader, but the most startling feature is the large red heatspread fin along the top of the stick. This puts the height of the sticks at 55mm, which is pretty tall. However, G.Skill has added the ability to remove this, by unscrewing the fin and sliding it off a groove on the top of the stick, which will allow for bigger CPU coolers. Also, the removal of the fin enables you to fit an alternative cooler for the memory, whether that's water based or some form of liquid nitrogen cooling.

The mere mention of liquid nitrogen is music to an overclocker's ears. The TridentX has been designed to accommodate overclocking and other forms of advanced computing. However, for the reasons we mentioned previously, we couldn't get the TridentX to go beyond 2400MHz and remain stable. Other overclockers with specialist motherboards might fare better, though.

Despite our lack of overclocking abilities, the SiSoft Sandra benchmark recorded a score of 32GB/s, just short of the HyperX Savage but beating the Corsair Vengeance. As before, then, the real-world computing and gaming tests were conducted without any bandwidth problems or anything else relating to a lack of memory speed or capacity.

The G.Skill TridentX is worthy RAM for any system, especially a gaming setup. The height may need looking into, depending on your setup, but the advantage of being able to better fit another cooling solution is certainly a bonus point. It's the most expensive kit we've looked at, though, so unless you have a specific need for the TridentX's talents, you might be better off opting for either the Vengeance or the slightly better performing Savage.

Mushkin Redline 16GB

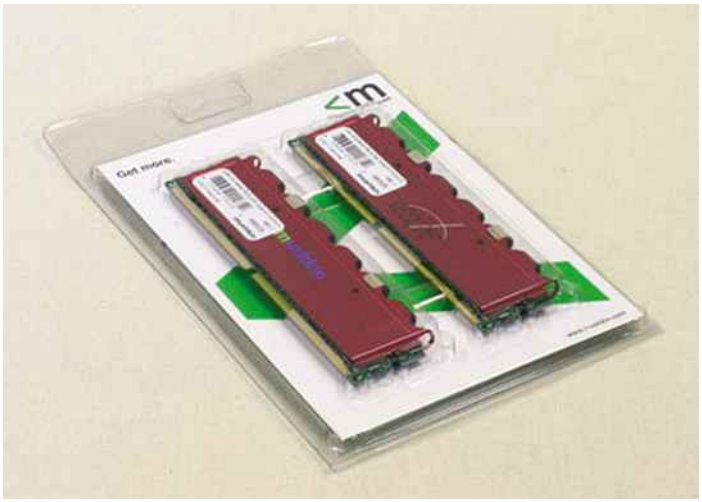
DETAILS
- **Price: £101**
- **Manufacturer: Mushkin**
- **Website: goo.gl/sMxxdX**
- **Requirements: Two DDR3 slots available, 1.65V**

You can be forgiven for thinking 'Who the hell is Mushkin?' because it's not exactly a household name. However, in the overclocking and enthusiast world, Mushkin has quite the reputation and is regarded as being the one to go for when building a powerhouse gaming system.

The Mushkin product range starts with the kit we're looking at for this group, the Redline. Moving up through the range, there's the Radioactive, Blackline, Eco2, Stealth, Silverline and Proline. Each has its own set of specifications and is targeted at a certain type of user, but the general theme of high performance branches across all models.

This Redline kit consists of a pair of 8GB PC3-19200, 2400MHz sticks, with the product code 997122R and costing around £101. The latency is a pretty tight 10-12-12-28, with a voltage of 1.65V. The sticks have a bright red heatspreader, using the aptly named Mushkin Ridgeback Heatink, a toothed top that's attached separately from the front and rear panels but does an excellent job of dispelling heat away from the chips. With the Ridgeback heatsink, though, the height of the RAM sticks hits 45mm, just slightly taller than the Corsair Vengeance but smaller than the TridentX.

The Mushkin Redline is a great performer



And it's reasonably priced too

Overclocking on the Mushkin Redline went considerably better than our previous attempts. We managed to get a stable 2540MHz at 1.66V, which isn't too bad. The SiSoft Sandra benchmark scores were also very good, with 32GB/s while in its default state and hitting a whopping 38GB/s when overclocked. This means the Mushkin is the overclocked leader but is tied with the TridentX at default speeds.

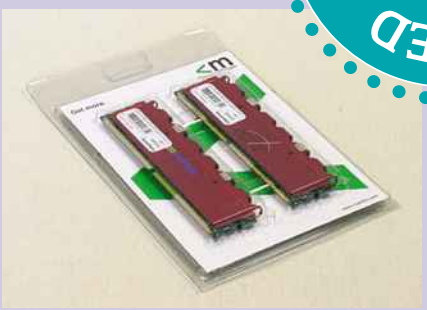
These are excellent scores and we imagine that with a better motherboard in place, one that's designed for overclocking, the numbers and clock speeds could easily be improved. To keep in line with the other reviews, the Mushkin Redline kit will happily play any modern game or other memory intensive program without any problems.

Considering the cost, currently the second highest by a pound, the Mushkin Redline kit is pretty good value. You get some great performance from these two sticks, and although they're a little taller in height compared to the likes of the Kingston ValueRAM, HyperX Savage or Crucial Ballistix, there's not that much in it.

Overall, we were quite impressed with the Mushkin Redline 16GB kit. It's certainly a kit that enthusiasts and system builders would consider for their next setup. For gamers, it goes without saying. If you're willing to spend a little more for performance on other elements of your system, then you shouldn't compromise on memory either.

Kingston HyperX Savage 16GB Kit

The Kingston HyperX Savage kit proved to be the best overall performer for cost and compatibility. It's not as tall as the Highly Commended Mushkin, by a good 12mm, and it's ever so slightly faster in its default clock setting too.



Mushkin Redline 16GB

The Mushkin Redline 16GB kit was very impressive. Good performance, not a bad price and with huge overclocking potential. This kit is well worth checking out when you come to consider your next system build.

How We Tested

Each RAM kit was fitted to a Gigabyte Z97M-DS3H motherboard, with an Intel Core i7-4790K, running Windows 10. We ran the SiSoft Sandra memory benchmark and averaged out the gigabytes per second, along with running *Batman: Arkham Knight*, *Submerged*, *Elite: Dangerous*, *Assassin's Creed IV* and *Civ 4*.

	Corsair Vengeance Pro Red	Crucial Ballistix Sport	Kingston ValueRAM	Kingston HyperX Savage	G.Skill TridentX	Mushkin Redline
Price	£100	£70	£65	£99/£69	£120	£101
Height	44.5mm	31.5mm	30mm	33.3mm	55mm	45mm
Product Number	CMY16GX3M 2A2400C11R	BLS2CP8G3D16 09DS1S00CEU	KVR16N11K2/16	HX324C11SRK2/16	F3-2400C10D-16GTX	997122R
Clock Speed	2400MHz	1600MHz	1600MHz	2400MHz	2400MHz	2400MHz
Latency	11-13-13-31	9-9-9-24	11-11-11-28	11-13-14-32	10-12-12-31	10-12-12-28
Voltage	1.65V	1.5V	1.5V	1.65V	1.65V	1.65V
GB/s Default Speed	31GB/s	23GB/s	20GB/s	33GB/s	32GB/s	32GB/s
Gb/s Overclocked	34GB/s	N/A	N/A	37GB/s	N/A	38Gb/s

Your Letters

Things To Do With A Pi?

Some time ago, I bought myself a Raspberry Pi, with the intention of dabbling in coding, which I did, but to my shame, I eventually gave up. Still, I had this Pi, so I thought I'd see what else I could do with it.

One option was to get the camera and use it as a security cam, but I don't really have any need for that, so I eventually set the Pi up as a media centre, and it's serving its purpose very well. There's no on/off switch, but I like it anyway.

The thing is I've now upgraded to the Raspberry Pi 2, and I still have the old one hanging around. I really want to do something with it, but I don't know what. I'm not up for trying coding again, but I would like a Pi-related project for it.

I was wondering, then, if perhaps some other Pi-owning Micro Mart readers have any ideas for what I can do with my old Raspberry Pi? Anyway, thanks for the mag.

George Felding

I Fought The Law And The Law Changed

I just broke the law. In fact, I broke it yesterday too, and I'll probably break it again tomorrow, to be honest. In fact, while I'm being so honest, someone really ought to come and arrest me, because I'll no doubt keep breaking the law until someone comes and stops me – I really am that much of a repeat criminal.

At least, I am if the courts of this country are to be believed.

I suppose you want to know what my crime is? Well, okay, I'll tell you, but promise you won't follow in my footsteps. After all, the life of a renegade isn't for everyone.

You see, I like listening to music with my ears. And because I can't make that music myself (I've tried, but the sound of me smashing pans with wooden spoons just doesn't match up to the rousing rhythm of a Phil Collins drum solo), so I have to listen to pre-recorded 'tunes' created by other people. Let's refer to these people as 'artists' or, as I prefer, 'musicians'.

Because these 'musicians' need to make a living and because their bosses each need to own five houses and a boat, one needs to pay for these tunes. At least one does, if one doesn't want to get them from the Pirate Bay.

But that is not my crime. No, I gladly paid for the music I enjoy, by buying recordings that somehow magically fit inside a thing plastic disc with a shiny bit on one side. I simply put one of these 'CDs' into a special player, press a button and music comes out.

This is a great arrangement and a completely legal one. However, these CDs, although quite thin, aren't that convenient to carry, particularly when you've bought a lot of them by spending lots of your money, which has apparently gone to the poor, starving artists, who otherwise wouldn't be able to buy solid gold helicopters and shoes made out of mermaid hair.

What's the solution to the chore of carrying these valuable discs around? Well, this is where we step outside the law, so look away if you're of a nervous disposition.

By using a piece of technology called a CD-ROM drive, available completely legally in any computer shop in the UK, I am able to extract the electronic essence of the music that I legally paid for and insert it into a machine called an MP3 player. Using this device, I can play the music I legally paid for without using the physical medium on which it was previously stored.

Shocking, right?

Of course, law-abiding citizens will realise that what I should have done in this situation was to hop on something like iTunes or Amazon and then pay again for the music that I had already legally paid for.

It's too late for me now, though. I've already 'format shifted', and I don't think I can stop now.

Please, people, don't do what I did. Obey the law without question, and pay for everything again because it's stored in a different format. That's the right thing to do! Also, stay in school and drink milk everyday (unless you're lactose intolerant, in which case, please don't).

Sincerely,

Anon

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Is The Smart TV Running Out Of Steam?

Mark Pickavance looks at the modern TV, and wonders if the concept has run into a brick wall commercially

As still a regular viewer of TV, I'm happy to accept that I'm part of a shrinking demographic. For example, the notion of a significant portion of the country sitting down at Christmas for a communal TV experience is one of historical interest, but far from a current reality. However much those in the TV industry make Canute-like protestations, the era of classic network TV is dead, buried and unlikely to be participating in a zombie apocalypse.

With viewing habits changing so radically since broadband internet became a staple of homes, there was bound to be an impact on the technology we use to digest the content and, having seen the dramatic conversion from old cathode ray tube technology to LCD, makers of the once-humble TV have since advanced to smart TVs in the hope of keeping sales healthy. The problem is that all their attempts so far have failed, so is the era of the TV coming to an end?

Success... Then Failure

The very first LCD display I saw was one made by Sony. It was owned by a colleague who paid more than £1,000 for a panel that offered a resolution of only 1280 x 1024 and was 11" diagonally. I wondered at the time when they'd be bigger and more affordable; eventually those things happened, but then the real trouble started.

It's easy to forget now that the early LCD panel days were fraught with production problems for their makers, who ended up binning as many as 95% of the screens that came off their production lines or selling many with a limited number of visible faults. Eventually these issues went away, as manufacturers refined their processes, and found ways to deliver acceptable yields and screens that came without any dead pixels. Once over that hurdle, though, they soon realised that, as all brands had cracked making these things in volume, the price would plummet, and it did. While the market for new flat-screen monitors and TVs blossomed, the margins declined massively, creating huge losses for the likes of Sony – losses from which some are still trying to recover.

> **"I'm sure 3D will be back soon, even if it patently doesn't deserve to be"**

Much to the dismay of companies that had long-relied on brand kudos, with relatively little to differentiate between brands in terms of quality, price became almost the sole factor that drove sales. Thus, in a desperate attempt to create a premium market, and the greater profitability that offers, makers started to introduce new features that might make their screens more valuable in the eyes of the buying public.

The first of these pushes came with 3D, but that wasn't the last. As each new product season brought more functionality (or gimmicks, if you prefer), the prices still dropped, however, as buyers continued to ignore everything but price.

Seemingly ignorant to what the market was telling them, though, TV makers stormed ahead with 3D and other technological gilding, despite there being little or no evidence that the buying public were keen on having these things.

3D

Anyone in the film industry can tell you the long and generally bad history of bringing that extra third dimension to the big screen. The current incarnation is at least the fourth attempt to convert cinema from 2D to 3D. Each time, however, the public has largely rejected it as being a gimmick.

While in recent years the major justification for using it seemed to be to charge more for tickets, even this ploy is now finding people choosing 2D by preference. A dozen reasons could be cited as to why 3D hasn't become the chosen viewing experience for many, but the critical ones are that few films are really enhanced by seeing them in that format, and for those who don't have vision that meets the technology's requirements, it just doesn't work.

The cumulative effect of these hiked ticket prices, and the converted movies originally shot in 2D but poorly post-processed in an attempt to cash in, was that studios and cinemas found themselves in a situation where the concept got itself a bad name. Indeed, anecdotally, people started to go out of their way to see the film without glasses or the headache they can induce.

Translating this to TV, the technology is much the same, if not slightly better, but the problems are much the same. Those interested in promoting 3D on TV saw it as a means to get the public to pay more for existing services, but for the most part they weren't prepared to do that.

Pushed initially for sporting and live performance and then for distributing cinema content, the amount of 3D material actually declined as time went by. Unlike HDTV, where the number of channels and amount of content quickly expanded, the number of 3D channels dwindled to almost nothing in the space of a few years.

One of the big supporters of 3D sports broadcasts, ESPN threw in the towel and pulled the plug on its 3D channels as early as 2013. In June, Sky finally closed its last dedicated 3D channel, moving what content it will offer going forward to its on-demand services.

The reaction of those who market TVs was swift. One year 3D was the headline feature in new products, and the very next it wasn't even mentioned.

These days most TVs that are greater than 40" support some kind of 3D, but we'd wager most of those bundled pairs of 3D glasses are destined to gather dust rather than be used by the owner. Alongside the enthusiasm for the technology, and the content that makes it worth having, the price premium for 3D has vaporised too. I'm sure 3D will be back soon, though, even if it patently doesn't deserve to be.

These people aren't sitting in the correct location to get the small effect that a curved TV is mean to create, unfortunately

Smart TVs

Based loosely on the success of the Apple TV device and hardware like the Roku, TV makers saw an opportunity to ride the wave of a streaming revolution in content viewing. The problem with what they came up was that it embodied the ethos of the TV makers: every man for himself. Because of this, there wasn't a single platform, and therefore no chance uniformity in the apps or services.

Samsung built its smart TV offering around Tizen OS, whereas LG used webOS and Panasonic used its own 'Veira Cast' and even Firefox OS. Users buying a new TV were forced to learn a new interface each time and hope (or research) that the streaming services they used were supported on whatever new platform they opted for.

What transpired was that, while most people realised the value of having these new video services available in their living rooms, they turned to dedicated hardware to deliver them – kit such as the aforemention Roku and Apple TV, Amazon Fire TV, Google's Chromecast or Android TV boxes. These allowed them to relocate the viewing to any display with a HDMI port in seconds, rather than have to replace all their TVs.

What didn't help was lots of smart TV reviews that complained about the poor performance of the TV-based systems, and how they would crash mid-episode or forget all their settings at every update. Owning a Samsung smart TV, I can attest that these issues aren't entirely resolved yet, even if some of the functionality does work acceptably.

What TV makers hadn't really considered was that not everyone sitting in a lounge wants to see one among them get Facebook updates over the top of a show or other types of social media proliferations. Eventually, the arrival of cheap Android tablets meant that those watching the TV could dip in and out of their social interactions without monopolising the TV or annoying those around them.

These points, coupled with the initial price premiums asked for 'smart' variants, largely consigned the idea to the also-ran category. Only now that almost all TVs have these features have the numbers started to increase. It's also been calculated by researcher NPD In-Stat that more than 50% of the smart TVs in the USA aren't even connected to the internet.

The fact that, even with no price premium to speak of, that smart TVs are only just crossing the 50% of volume sales says volumes about how poorly this concept has been in connecting to customers.

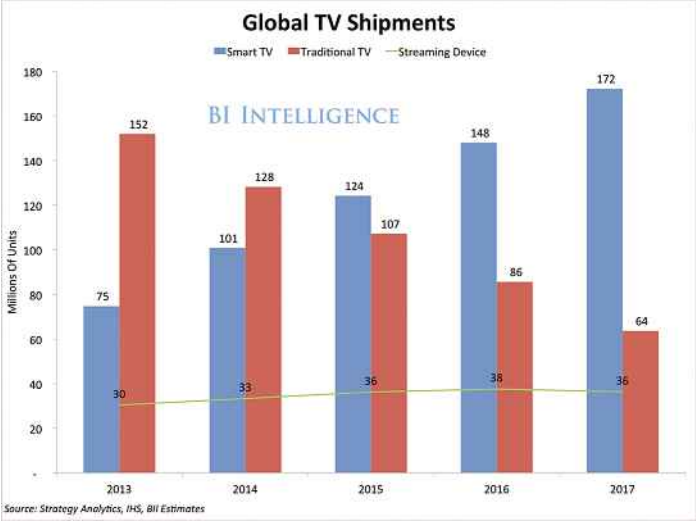
Curved Displays

Having failed to wow the public with 3D or smart features, a number of brands decided to take on the evil of perspective, as experienced by any creature with an optical sense system. The whole thrust of curved displays seems odd, though. As humans with stereo vision, having things get smaller as they get further away is something

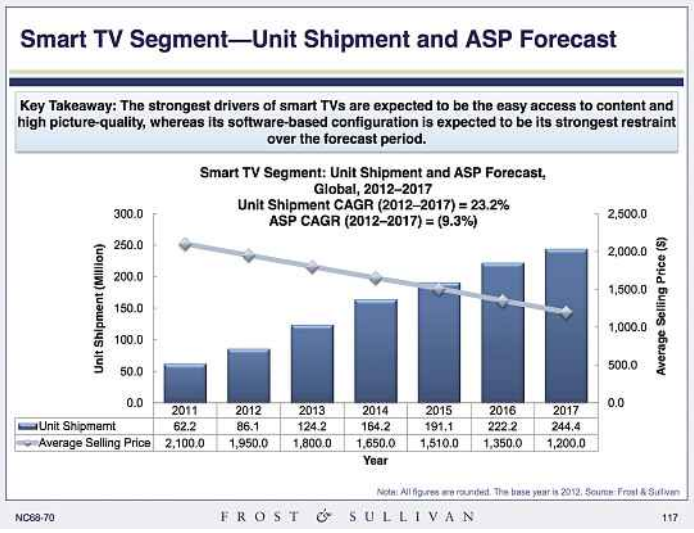
This £400 device from Samsung is meant to fix some of its 2013 4K TVs so they can show sport, but until there are some services to test it's all merely hypothetical

we instinctively learn to cope with from early childhood. For the technically minded, there are actually two distortions occurring when we look at things, only one of which is the created by perspective. The other, as researched by Hermann von Helmholtz in 1867, is that the optics of the eye introduces a small amount of what's called 'pincushion'. This is caused by image magnification increasing towards the edge of the visual frame, causing the centre to slightly bulge. The problem with addressing that effect is that how much it occurs is specific to each person (and even each of their eyes), so making a curved screen to counter it is practically impossible.

What TV makers did instead was imagine the viewer is sat at a focal apex and then curve their screens so that the edges are the same distance from the viewer as the centre. To experience any benefit of this, however, the viewer or viewers need to be a very precise distance away from the screen, and the number of people who can sit in that sweet-spot is low. Possibly a close couple, neither of whom has been eating garlic recently. What's more, there is also no vertical curve, because that would be outrageously expensive to make, so the effect is only in a single plane.



A projection of Global TV Shipment created by Strategy Analytics. Only this year will smart TVs overtake dumb ones, and there is no significant growth in sales overall projected by 2017



A projection of smart TV sales that was created by analyst Frost & Sullivan in 2013. The growth of sales never materialised, and the selling price decline was even greater than calculated

The arguments made by TV makers as to why this is better are quite funny if, like me, you tend to apply any great analysis to them. One of them is that it give you more a 'theatrical experience', even if the vast majority of cinemas don't have curved screens and most of the audience isn't sitting at the vertical or horizontal midpoint of the screen. However, if you live alone, sit three feet from your TV and remember a cinema experience that virtually nobody born in the past 50 years in this country will recall, then the curved TV is definitely for you.

Curved TV were the big product launch of 2014 for many brands, but they still only represent a minority of TV sales. A quick look at the TV section of a high street vendor revealed that of the 160-plus TVs that they sell just 32 were curved; 21 of those were made by Samsung, five by Panasonic, four by LG and just two by Sony.

"If you bought a set in 2013 and early 2014, then sorry, it won't do sport"

If Samsung hadn't convinced itself that eventually people will demand a perspective-free world, this concept would be on the same footing as 3D.

Curved screens seemed 'high tech' but deliver very little that those who buy televisions actually want.

4K

I've reviewed a few 4K monitors in this magazine, and they can be exceptionally impressive for working on detailed graphics or high resolution images. They also represent the latest push from the TV makers to get people to upgrade perfectly good, working TVs to something new.

Again it's Samsung leading the charge, with 28 mainstream products followed by about half that number by Panasonic, Sony and LG. However, there are numerous problems with 4K that, in many respects, mimic the early days of HDTV, where the TVs appeared to be a solution in search of the problem.

The major difficulties in this case are the almost complete lack of 4K content with which to show off your new purchase and the bandwidth issues in bringing it to a set through existing pathways. There are some sources for 4K streams, like Amazon, but the selection is very limited and requires a very good broadband connection to maintain a smooth frame-rate.

There are other problems with it from both a technical standpoint, and also in the public perception of the technology: that it is relatively difficult to differentiate from HDTV in many circumstances. The problem that TV and monitor makers are starting to confront is the limits of their customers' ability to see the difference in a way where it's obvious if they're watching 4K and not HDTV.

Sky TV will soon be offering sport in 4K for those who didn't buy their TVs in 2013

The best a human eye can generally see is about a 0.5 arc minute (an arc minute being a measurement equivalent to 1/60th of a degree or 1/21,600 of a circle: **tinyurl.com/oetjucy**) and only really in the centre section of the eye. On a HDTV you need to sit about 1.5 times the diagonal measurement away to get the full effect (very approximately) or 63" from a 42". With 4K you'd need to be twice as close to see the detail on the same size of screen – or less than three feet away! The answer is obviously *much* bigger screens. However, the number of homes in the UK where you could reasonably mount a 70" (or bigger) TV, or where the residents could afford to shell out the money for a TV that big, is limited.

It's worth noting that when HDTV arrived many of people complained they couldn't see the difference between it and standard definition, so it's not like there isn't some precedent here. A friend of mine was one of those people, and I recall that she bought a 42" TV and placed it in room where the seating was at least 15ft from the TV. At that range you wouldn't be able to tell the difference unless you're a bird of prey.

Because of all these factors, 4K TVs that are less than 55" are mostly senseless and useless, and until they actually get sufficient content they're not much use whatever size they are. Other potential pitfalls have emerged in recent months for those who got on the 4K bandwagon early, to do with the frame-rate that these displays can handle.

In an interview that Chris Jones, Sky's chief engineer of broadcast strategy, did with *IBTimes* UK, he outlined the reason why these TVs will not have what it takes to accept sports content on 4K streams:

"If you bought a set in 2013 and early 2014, then sorry, it won't do sport," he said. "It'll only go up to 25 frames per second. If you bought a set last year, even a set in the sales this summer, this spring, then I'm sorry, it won't do High Dynamic Range, which gives you better, brighter pictures."

It's Sky's intention to broadcast sport at 100MHz in 4K, and those early designs that can't handle that won't be able to present those shows. However, at this time, it looks like BT will launch its 4K sports service ahead of Sky's anyway.

Some manufacturers have held out an olive branch to their customers lacking 100MHz frame-rates in their TVs, though mostly in order to beat them a little harder. Samsung has announced the UHD Evolution kit, an enhancement for some of its 2013 designs that will bring the setup to muster, but set you back £400 for your trouble. The real kicker in this, though, is that until Sky and BT release detailed specifications for their services, it's far from certain that this pricey upgrade will solve sports viewing issues at all.

The 4K debate has become a typical technological chicken-and-egg conundrum: it won't take off if there isn't anything to watch, and without many people having the hardware, there's no desire among broadcasters to bear the cost of providing many streams to see.

4K is already looking like a long term prospect. The truth is, though, that it will probably only move forward with any real momentum when the TV makers stop making 1080p panels for good and people are forced to take up the option.

Sales Or Profit... But Not Both

Having outlined the multiple attempts that TV makers have made to inject some pace into TV sales, it pays to remind ourselves just how disappointing, at best, the results have been. To put it in perspective, the global market for TVs is hovering around 200 million units, and Apple will sell more iPhones than that alone this year.

LG Electronics, a major smart TV brand, posted a massive plunge in profits in the first quarter of 2015. Net income was just $44.91 million – down approximately 59% on the same period in 2014. LG makes lots of electronics, thus the albatross hung around the neck of LG's home entertainment division, where sales declined 18%. That resulted in a $7m loss for that part of the company where the previous year it made well over $200m

> **"The global market for TVs is hovering around 200 million units, and Apple will sell more iPhones than that alone this year, to put that in perspective"**

in profit. When releasing these hard numbers, LG projected that with sufficient marketing it could improve them, however: "A stronger focus on 4K ultra-HD and OLED TV marketing and increasing demand in Asia and North America for all TV products are expected to improve the outlook for the LG Home Entertainment Company in the second quarter."

However, logic surely dictates that, spending more money on advertising to sell the same number of TVs next year will lead

to a reduction in the profitability of these items, however you rearrange the desk chairs.

LG is Korean, but the Japanese TV makers are having an equally torrid time trying to compete with it and their Chinese rivals. Both Sharp and Panasonic admitted to a steep drop in sales at the end of 2014, and their intention is now to focus on home market sales where they could make profit.

Sharp has already curtailed TV production in Europe and signalled an intention to reduce the range of products it markets in the US. This comes after it lost a whopping $255 million across the year, having previously predicted a similarly large profit. A downturn of over half a billion dollars can't easily be ignored, but it's disturbing to consider that compared with Panasonic, Sharp is actually doing rather well.

Falling sales of Panasonic TVs contributed to the seventh straight year that this part of the company posted a loss, causing it to stop making them altogether in China and seriously consider withdrawing from the US market.

Toshiba reported a 8% drop in sales, while Sony confounded expectations by making a small amount of money. More people would be impressed by Sony's success, though, had it not lost more than $7 billion through its TV manufacturing endeavours over the past decade.

What's interesting is that global sales of TVs actually went up in 2014, though they're expected to be flat in 2015 and actually drop in 2016. That suggests that demand is generally weak, could easily be scuppered by any regional economic downturns and, for most of those involved, only borderline profitable.

Final Thoughts

Thinking deeply about TVs in general has made this writer realise that, while we wanted large flat displays for at least 40 years before they became a reality, when they eventually turned up, TV viewing had changed dramatically and the need for them was suddenly in question.

The viewing evolution, alternative personal devices like tablets and phones, the failure of new features to engage the public and too many brands are making TV manufacturing a risky business.

Makers now have very fine margins on even the premium devices, and yet the low pricing of these devices still isn't driving TV viewing up. Possibly more problematically, the justification for the value added parts that TV makers seem inclined to add appears to have little or no impact on sales. Buyers are generally looking for size and a build quality, but at a price. Enticements like 3D and smart functionality aren't even secondary considerations.

The elephant in this lounge, though, is VR technology. That will see monitors and displays come in head-mounted solutions, where the apparent scale of the presentation is a configuration choice, not a cost implication. If we start watching streamed shows and live broadcasts through these devices, then the market for TVs, smart or otherwise, might dry up remarkably quickly.

As for the current crop of branded products, they're just saving you the cost of a Roku or Chromestick, usually with poorer performance and more limited choices. With live channels on interactive catch-up and streamed ones inherently rewatchable, the need for live recording is largely moot.

So, when you look through the feature set of many TVs, the order that they're given precedence by the makers tells a compelling story. 3D usually isn't mentioned, smart TV functionality is relegated to the middle of the pack, and (unless the brand is Samsung) curved panels aren't considered even vaguely mainstream.

What's usually centre stage is image quality and colour representation. If you wanted those specifically, you'd go for OLED if it wasn't so relatively expensive as a technology.

Given the billions splashed on the various enhancements and their marketing and how badly most of these have played with the public, you'd not be unreasonable in thinking that the industry would be keen to develop a radical new strategy. Yet, I can't help conclude that TV makers are small furry creatures caught transfixed in the headlights of a streaming eighteen-wheeler, reliant on the continuation of viewing habits formed in the 50s and 60s that probably don't have a long-term future. 4K isn't likely to change that, as neither 3D nor curved display did before it.

If those manufacturers can't change, then they're likely to suffer the same fate as many fluffy things have in the headlights of fast moving heavy goods vehicles over the years. There is a saturation point for big TVs in the world that we're probably approaching, and after that point those making them could easily go out of business. **mm**

Relocate Files And Folders With Symlinks

Make the most of external disks and SSDs by using symlinks to move files and folders. Roland Waddilove shows how to create them

A symlink – or symbolic link, to give it its full name – is a useful feature that was introduced into Windows Vista and has been carried through all the way to Windows 10. It enables files and folders to be moved without breaking compatibility with the operating system or applications, and has several obvious uses. For a start, it's a handy feature for anyone with an external USB disk drive or a solid state disk drive (SSD).

Microsoft did not invent symbolic links, though, they have been around for decades, having been first introduced into the Unix operating systems over 35 years ago. They have an interesting history in Windows, though, one that makes it is easy to see why Microsoft built in support for them when you look at Windows XP and Vista. It is also an excellent demonstration of their uses too.

If you have access to a Windows XP computer, open Explorer and look at the root of the disk drive. There is a folder called C:\Documents and settings. Applications store data there, and you can see the files and folders for each user account. You have a folder in C:\Documents and settings where all your personal files and application data are stored.

With Windows Vista Microsoft decided it was better to have a C:\Users folder to contain users' personal folders and C:\ProgramData to store application data. Windows 7, 8 and 10 continue to use this scheme. The problem is that many applications were hard coded to read and write to the C:\Documents and Settings folder and so would break on Vista.

The solution, of course, was to employ symbolic links in order to redirect any program that tried to access C:\Documents and settings to C:\users. Applications then continue to work exactly as they did before with Windows XP, because they think that they are reading and writing to C:\Documents and Settings, but actually Windows is secretly redirecting everything to C:\Users and C:\ProgramData.

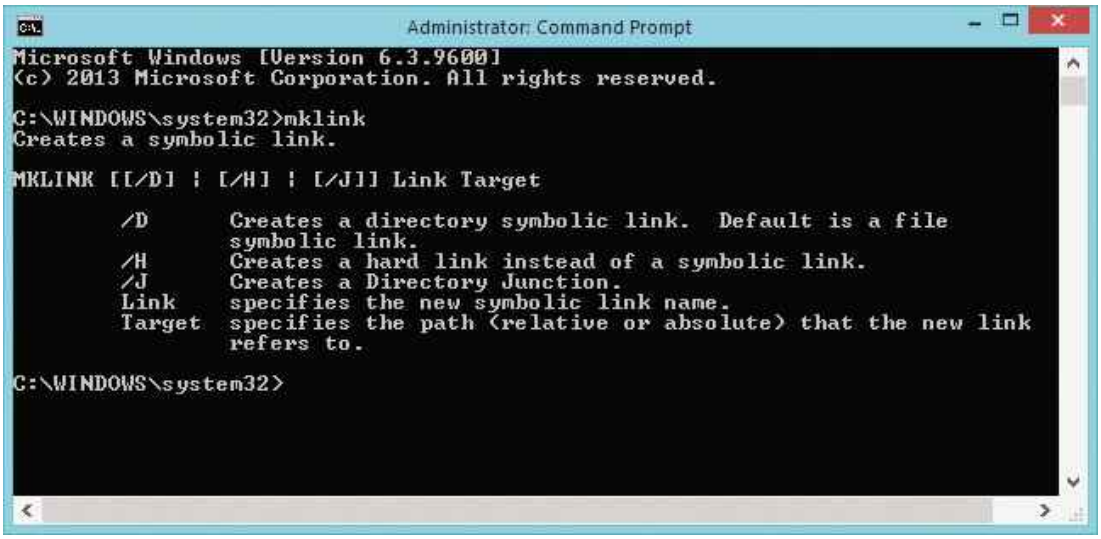
A symlink is virtually transparent to an application, and can also be used to move a folder or a file to some place else, while allowing it to be accessed using the old file path. It fools applications and Windows into thinking the file or folder is still at the old location when in fact it is somewhere else.

This is useful if you want to move a file or folder to a new location on the same disk as Microsoft did with XP and Vista, but it also enables you to move them to a whole new disk drive. If you have a high capacity external USB disk drive, such as 1 or 2TB for example, but a small internal disk drive that is nearly full, you could move files and folders to the external drive where there is lots of space.

SSDs are much smaller than mechanical disk drives, so if you replace the drive in your PC with a fast SSD you could easily run out of storage space. Moving files or folders to the external disk and replacing them with a symlink is the perfect solution. You could move an application in the C:\Program Files folder for example, to an external disk drive or SSD and just replace it with a symlink. Applications and even Windows would continue to think that the Program files folder was still on C: and it avoids problems that would otherwise occur. Try dragging the C:\Program files folder to an external drive and you will quickly discover that it does not work.

Create Symbolic Links

If you want to create symbolic links in Windows you must resort to the command line and use mklink. There is no native graphical interface for it, and you must carefully enter the command and the right parameters. In Windows 7 go to Start > All Programs > Accessories, then right click Command Prompt and select Run as administrator. In Windows 8 press Windows+S and enter 'command prompt', then right click it in the search results and select Run as administrator.



Use mklink to create symbolic links. On its own it displays help information

Type mklink at the command prompt to see the help information. Ignore hard links and junctions, which are variations of symbolic links and the command boils down to two possibilities, 'mklink [*Link Target*]' or 'mklink /d [*Link Target*]'. Suppose wanted to move a program from C:\MyFolder\MyProg.exe to D:\Files\MyProg.exe, you would use the first version of the command like this:

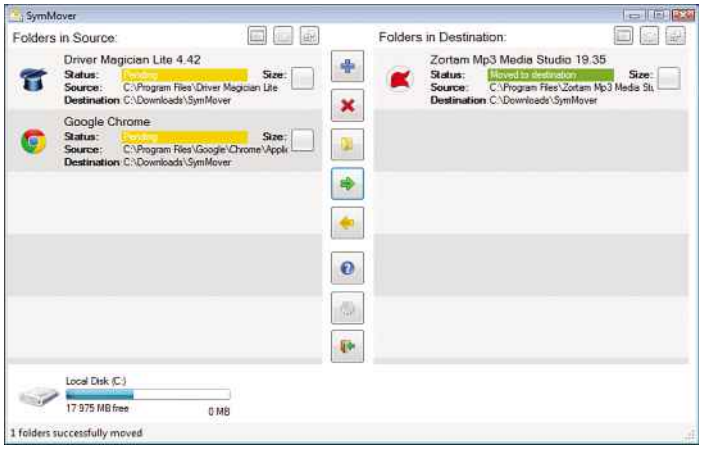
mklink C:\MyFolder\MyProg.exe D:\Files\MyProg.exe

Link is the symbolic link to create and Target is the new location it points to. To move a folder, or directory as it is sometimes called, you use the /d parameter:

mklink /d C:\Folder D:\NewFolder

Two very simple file and folder paths have been used here and if there were spaces in the names you would have to use quotes, so C:\My Folder should be entered as "C:\My Folder" on the command line.

In practice what you would do is to move the file or folder to the new location using Explorer. Then create the symlink in the original location. Symbolic links work most of the time, but occasionally they don't and it depends on the software that is accessing the folder. If there is a problem, you could try replacing the /d parameter with /j, which creates a junction, which is a different type of symlink.



SymMove can be used to move software to a new location using symlinks

Third Party Tools

The mklink command line utility is not hard to use, but long paths are prone to typing slips and are tedious to input. There are some utilities that can make the job easier, though. SymMover, for example has been around for years – so long, in fact, that the original website has disappeared – but it is still available from **cnet.co/1MxEvjR**. It is designed to make it easier to move programs to new folders or drives.

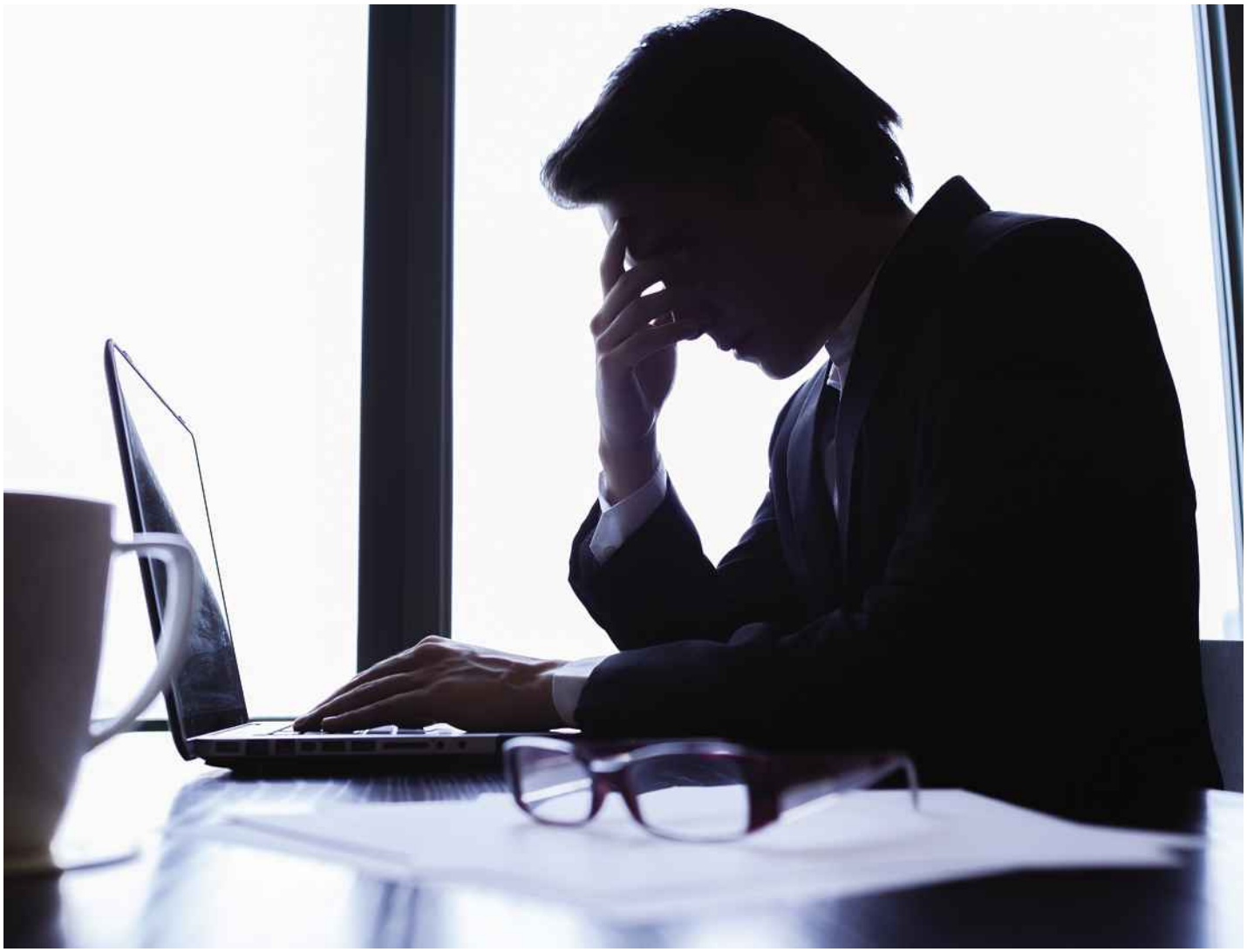
Run it, and click the gear icon to add a destination folder, such as E:\Programs. Then click the plus button and it lists the programs that can be moved. Select the ones you want to add to the source list. Clicking the right arrow moves the source items to the destination folder and replaces it with a symbolic link. Programs can be selected and moved by clicking the left arrow. It's useful for moving programs from one drive to another, but it's a bit buggy.

Link Shell Extension (**bit.ly/100GnDc**) adds extra items to the right click menu in Explorer windows. Right click a folder and select Pick Link Source, go to another folder and select Drop As, Symbolic Link. It creates the symbolic link to the source folder. If you wanted to move a folder you would move it first and then create a link to it afterwards in the original location. As with SymMove, it seems a bit unreliable, working some times, but not others. It is worth trying though. **mm**

Shortcuts And Symlinks

A shortcut is a sort of symlink,and it has its uses, but it is nowhere near as powerful. A shortcut is a pointer to a file or folder, and the Start menu in Windows 7 is basically a collection of shortcuts. They are links to the actual location of the program. A shortcut can be created by right clicking a file or folder and selecting Send to > Desktop (create shortcut). An icon is added to the desktop that, when clicked, opens the folder or file, or runs the program. You can also create a shortcut by right clicking the desktop and selecting New > Shortcut. You are prompted to enter the path to the program, file or folder and the shortcut is created.

The difference between a shortcut and a symlink is that a shortcut cannot replace a file or folder, it is an icon that points to it. It is not possible to move C:\AnyFolder to D:\AnyFolder and replace the original folder on C:\ with a shortcut. Replace it with a symbolic link and it will be fine though. It is because of the deeper integration with the file system.



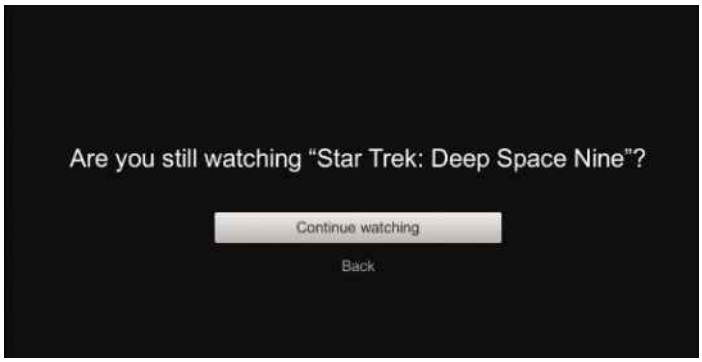
Is The Internet Affecting Your Mood?

Are our computers damaging our mental health? And if so, can they also help us overcome that damage? Sarah Dobbs finds out...

How many hours per day do you spend on a computer? For most of us, at least eight, right? We sit in front of a computer all day at work and then probably come home and use our own PCs to browse the internet, play games, interact with people on social media or watch Netflix. Throw in the time we spend messing with our smartphones, and it adds up to an awful lot of time spent looking at a screen, rather than other humans.

And unfortunately, that might be a problem, because recent studies have started linking heavy computer usage to all kinds of health issues, from obesity to depression. Using computers and smartphones excessively can also cause sleep disorders, and it's also linked to stress.

That's all bad news, but before you quit your job and head off to live on a remote farm with no telephone line, let's see what can be



Binge-watching on Netflix triggers a pop-up to make sure you're still there

done about it. Technology might be causing us problems, but it might also be able to help us get through them…

Technology And Health

We've talked a lot in this magazine about how using your computer for too long can impact your health – usually because bad posture can lead to backache, too much typing in awkward positions can cause repetitive stress injury and squinting at a screen for too long or in poor light can damage your eyesight. And all those things are still relevant, but you know what the advice is going to be already: adjust your workstation properly, take regular breaks to stretch and move around and get your eyes tested.

What we maybe haven't talked about quite so much is the impact technology can have on your mental health, but there have been studies into how extended computer usage affects mental health for years. One of the biggest studies was carried out by Chiba University in Japan, in 2003. Over three years, Dr Tetsuya Nakazawa and his team surveyed 25,000 workers and found that those who spent more than five hours a day at their computers were more at risk of depression and insomnia.

And then in 2010, researchers at Leeds University came to a similar conclusion when they surveyed 1,300 people in the UK. Using a questionnaire to find out people's internet habits and the Beck Depression Inventory to measure their mental health, Dr Catriona Morrison et al found that people classified as "internet addicts" were more likely to be depressed than non-addicts. Which came first, the depression or the internet addiction, can't be established, and the sample size used was pretty small, but even so, it's a bit concerning.

If this is ringing bells, though, you're not alone. The problem is that the way we use computers – social media, in particular – might as well have been designed to make us dependent on it. The internet has opened up a whole new world of information and lets us talk to people we would never have encountered in our daily lives, which can be a positive thing, but it has a darker side, and if you find yourself spending a lot of time scrolling through Facebook or Instagram and feeling crappy about it, it might be time to try to pry yourself away.

Turning It All Off

Going cold turkey on the internet might be a bit of a shock to your system, though – and anyway, if you want to keep in touch with friends and family, sometimes sites like Facebook or Twitter are necessary. But if you reckon using them is starting to do you more harm than good, it might be time to limit the length of time you spend there.

And of course, there's an app for that. Freedom (**macfreedom.com**) is one of the most popular – available for PCs, Macs and Android devices, it blocks internet access for a predetermined time, letting you get on with your life without being tempted to just check whether your favourite blog had updated.

> **"Time isn't the only factor in deciding whether or not your use of technology is healthy or not"**

There's an obvious downside to that, though, which is that you might need some internet access to do your job. If that's you, you might want to look into something like Anti-Social (**anti-social.cc**), which works with PCs and Macs and can be set to block whatever websites you want. That might include Facebook, or it might be a forum you're spending too much time on or a gaming site or whatever. Again, you can set timers, so you can get back on your favourite sites later.

If you're a Firefox user, the extension LeechBlock does much the same job; the Chrome alternative is StayFocusd. Both of these will stop you from reaching sites you shouldn't be spending time on and force you back into more productive browsing.

If Netflix is your poison, you might have noticed that the service pops up its own 'Are you still watching?' message if you binge-watch too many episodes of a TV show. (If you haven't, you may judge me; I've run into it several times.) Since Netflix will keep playing TV episodes forever if you don't hit stop, this might just be to make sure you haven't fallen asleep and missed the last three episodes, but it can feel a little… accusatory sometimes. Still, it's probably worth taking the pop-up as a reminder that sometimes you need to get off the sofa and stretch your legs.

Content Warnings

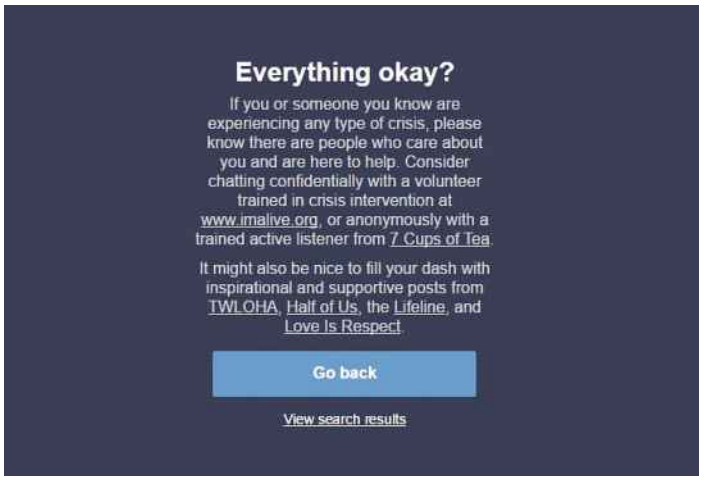
Time isn't the only factor in deciding whether or not your use of technology is healthy or not, though; there's also the question of what you're doing, and what kind of content you're consuming. Most social networking sites have extensive policies detailing exactly what is and isn't acceptable, and along with illegal content, that can include

When Social Media Doesn't Help

Social media can be great for keeping up with friends and family you don't see very often, and also for forging new bonds with people you might not meet in reality. But doesn't it sometimes make you feel a bit sad to see everyone's shiny perfect lives being plastered all over Facebook, Instagram, Tumblr, Twitter and everywhere else?

Dubbed 'Facebook envy', the phenomenon of feeling bad about your own life after looking at other people's social media posts is pretty common. It's even been researched, and according to various academic types from the University of Missouri, Nanyang Technological University and Bradley University, it all comes from social comparisons. Compare someone else's photo of a sunny beach holiday with your own rainy grey reality, and it's easy to see why you'd feel down.

The thing you have to keep in mind is that everyone tries to make themselves look good on social media. You don't share photos of a meal that went disastrously wrong or a day your hair looks rubbish – and neither does anyone else. Comparing your own reality to a highly edited version of someone else's life isn't a fair comparison. Even Taylor Swift has her off day. She just doesn't Instagram them.



▲ *Search for mental illness-related terms and Tumblr asks how you're feeling*

material likely to do harm to others. That includes hate speech (which, for example, Facebook defines as attacks on people based on their race, ethnicity, nationality, religion, sexual orientation, sex, gender, gender identity or disability or disease) and anything related to self-injury, bullying, and violent or graphic content.

All very well, except social networks like Facebook are huge, sprawling things with thousands upon thousands of users posting content every day, which makes it hard to police what really does get

> **"Recent studies have started linking heavy computer usage to all kinds of health issues"**

posted. Users can generally report infringing material, but by then the damage may be done. And sometimes content that wasn't doing anyone any harm – like breastfeeding photos – might get caught in the crossfire.

Tumblr might have found a way of dealing with the difficult question of harmful content, though: by tackling it at the search level. Search for terms related to mental health issues – 'depression', for example, or 'anorexia' – and you'll get a message from Tumblr asking if you're okay and offering resources you might like to look into to get help. Tumblr has also begun to add content warnings to certain blogs; outright harmful content is removed, but since some users have said they find it helpful to be able to talk about things like eating disorders and self-harm with their friends on the site, Tumblr has decided to add the warnings instead of banning all mention of the issues. It's a sensible-sounding policy, and Tumblr has worked with mental health organisations both to find the best ways to express their warnings and to make sure they catch all related keywords, to offer their users the best possible support.

You could argue that it's not the responsibility of a website to monitor the mental health of its users, and that would be true, but at the same time, it's quite reassuring to think that vulnerable Tumblr users aren't just shouting into a void. And if at least one person takes the advice to call a helpline when they're in need, then that's got to be worth something, right?

Although no such system is ever going to be completely perfect, it seems like Tumblr is setting a good example that other sites might want to consider adopting in future.

Supportive Apps

Let's go back to those studies about depression and computer usage for a moment. Since causation hasn't been established, it might be that spending too long online leads to depression, but it could also be that people suffering from depression spend more time online (ditto anxiety and other disorders). Maybe they don't have many supportive people in their lives or maybe they find it easier to make social contact through a computer than in reality. For many people, the internet is a vital lifeline, and just saying 'Get off your computer and you'll feel better' won't help.

For those people, then, it might be useful to find networks and apps that offer something more than the endless cycles of bragging that Instagram and Facebook can devolve into. Something like 7 Cups Of Tea (**www.7cupsoftea.com**) could be invaluable. Created by psychologist Glen Moriarty, the site offers a free and anonymous connection to a trained listener. Everything discussed is confidential, and someone will be available at all times. As well as a website, there are iOS and Android apps, so it's easy to access a listener, wherever you happen to be – and you don't have to schedule an appointment.

Another option is Kindly (**kindlychat.com**), though anyone can sign up to be a listener without going through any training, so for more serious issues, it might not be entirely helpful. Still, sometimes just knowing an option exists can be a comfort, even if you don't need to use it. And it's encouraging that there are people willing to donate their time to helping someone, rather than trolling YouTube comments.

Look After Yourselves

If you've never felt affected by things other people post online, then all these services and warnings might feel a bit over-protective. But if you don't need to use them, they're easily ignored. Even Tumblr will let you click through to see posts tagged 'depression' if you really want to, and you can just skim over its gentle suggestion to seek help.

If you reckon the internet is affecting your mental health, though, it might be comforting to know that there is help out there – whether you want to spend less time in front of your PC or not.

(And all of us could probably do with more regular screen breaks, even if only for the sake of our eyesight.) **mm**

If You Need To Talk To Someone...

Honestly, if you're suffering from depression or another mental health issue, all the Facebook Likes in the world probably won't help as much as talking to someone. If you need help, try one of the following:

The Samaritans
Phone: 0845 790 9090 Website: samaritans.org
Available 24 hours a day, every day, the Samaritans are there to listen to whatever you need to talk about, and promise they'll keep everything confidential.

No Panic
Phone: 0844 967 4848 Website: www.nopanic.org.uk
Open from 10am to 10pm every day, the No Panic helpline is specifically for people struggling with anxiety disorders.

Mind
Phone: 0300 123 3393 Website: www.mind.org.uk
Another mental health charity, the Mind phone lines are open 9am to 6pm, Monday to Friday, and can help with advice on where to get help – for yourself or others.

Top 5 Ways To Kill A Smartphone

A few reasons why getting insurance on your phone might be a good idea

1 Drop It

Two of the things that separate us from more primitive creatures are our opposable thumbs and fine motor skills. They allow us to do all kinds of wonderful things, like fashioning tools and playing musical instruments. But for some reason, these qualities count for very little when you're holding an expensive smartphone. Obviously not everyone is as clumsy as we are, but we're sure that at least a few of you have done what we have, where you're holding your trusty phone in your hand, perhaps while making a call, and it just frees itself of your grip and lands face down on the floor. If you're lucky, when you pick it back up, it'll look the same as did before its rapid descent. If not, you'll find the screen has been scratched or, worse still, cracked. The good news is that you're allowed to cry.

2 Drown It

Quite a few top-end smartphones now feature water resistance, but it's probably fair to say that most are extremely averse to contact with liquids. It's pretty obvious that you shouldn't dunk your handset into water, but unfortunately clumsiness combined with proximity to fluids sometimes means it happens anyway. In the Micro Mart team alone, at least two people have managed to do this, with one of us dropping a phone in a toilet and another submerging their device in a pint of beer. At least in the latter case, that person had something to drink to console himself afterwards.

3 Flash It

When we're not dropping our phones onto concrete or into water, we also like to tinker with them. After all, there are basically miniature computers, so why wouldn't we? That, as you might have guessed, includes messing around with the software they run, by flashing new Android ROMs or jailbreaking iPhones. So far we've never managed to break one of our devices by doing this, but head onto the internet and you'll soon find many horror stories from people who say they 'bricked' their phone by attempting software modifications. Thankfully, in most cases, these devices aren't truly bricked and can be recovered, but sometimes there really is no way to rescue them.

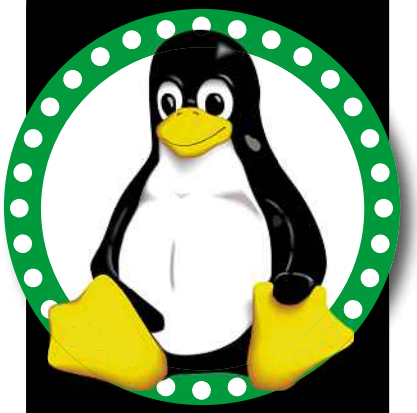
4 Crush It

Most modern phones are fairly robust, but they should still be treated with respect. So if you're in the habit of putting your fancy mobile in your back trouser pocket, it's best to remove it from that position before you go sitting down. Even if you're particularly svelte, smartphones really aren't designed to withstand the entire weight of an adult human pressing down on them. If you do managed to sit on your phone, you'd better pray that crunching noise is coming from your stiff back and not from an expensive electronic device that's just been reduced to smithereens.

5 Blend It

This particular mishap is unlikely to befall on your phone unless you happen to work in a blender testing facility, but thanks to blender company Blendtec and its founder Tom Dickson, we know that smartphones really don't like being subjected to fast-spinning blades. The 'Will It Blend?' series of viral adverts has seen Dickson blending all kinds of things to demonstrate his products' power. Of interest to us here, though, is his destruction of mobile devices, and if you head to **youtu.be/lBUJcD6Ws6s**, you can witness him turning both an iPhone 6 and a Samsung Galaxy Note 3 to dust.

▲ *"How am I going to play Angry Birds now?!"*



New OS Time

With Windows 10 now out, what's new for Linux?

David Hayward has been using Linux since Red Hat 2.0 in schools, businesses and at home, which either makes him very knowledgeable or a glutton for extreme punishment

Linux

Windows 10 is now firmly out and about and installed on several million computers around the world. To be honest, I like it. It's quick, looks good, runs well, and aside from the odd occasional issue where I have to unplug and replug my USB speaker bar ever so often for it to work, the whole process of upgrading free from Windows 7 to 10 has gone very smoothly.

But what's available for those who haven't or don't want to upgrade to Windows 10? Naturally, they could stick with their older Windows version or if they're not ones to go down the Microsoft route, they could try out these recently released distros.

Korora 22

This Fedora-driven remix distro has had its long awaited release to version 22, named Selina. With KDE 5 and a choice of other desktops, this Adobe Flash-less distro has a solid foundation and a healthy following of users across the forums that support it.

It's a good release, and although I'm not a KDE user myself, version 5 on Korora does look splendid. If you're interested in what's on offer, head on over to the distro's home page at **kororaproject.org** and show your support.

Zorin 10

Zorin was one of my main desktop distros a while ago, but after a catastrophic hardware failure, the PC was put out to pasture and Zorin along with it.

However, I may have to once again sample what the Zorin brothers have cooked up for the latest release of Zorin 10.

Version 10 is based on Ubuntu 15.04 and features a refreshed list of packages, new media player, Geary Mail, Activity Journal and a fresh approach to its visual style, themes, fonts and icons. Needless to say, it looks very nice indeed, and as before there's more customisation under the shiny veneer to give the user an unparalleled Linux experience.

For more info, head over to **zorin-os.com** and the Downloads section.

> **"I may have to once again sample what the Zorin brothers have cooked up"**

Ubuntu 15.10 Alpha 2

For many users, Linux is Ubuntu. Despite a few fumbles here and there in the past, you can't knock the popularity of the distro and its continuing success and popularity with its users.

Those who like to test the 'bleeding edge' of Linux distros will be glad to hear that the second Alpha build for Ubuntu 15.10 has been released and is available for developers, keen enthusiasts and system builders to play around with.

Since this is an alpha, it's not going to be stable, so anyone who wishes to give it a go should really try it out in a virtual environment or on a second machine. But from what I've seen so far, the Wily Werewolf (not too happy with the name of that one) is shaping up to be one to take notice of.

If you're up for a spot of testing, go to **goo.gl/1sdwdF** and find the appropriate link for 32- or 64-bit systems.

These are just a few examples of what's currently available, if Windows 10 doesn't float your boat or if you simply fancy having something different to test and mess around with.

Until next week, folks.

Cinnamon on Korora 22: looks pretty good to me

Amiga30UK

Sven Harvey visits the UK 30th anniversary event

After what seemed an eternity of waiting until Sunday 2nd August, I had the pleasure of attending the UK celebration event for the 30th anniversary of the Amiga unveiling. The event, run by Steve Crietzman and his team at the Peterborough Marriot hotel, boasted one hell of a guest line-up, all in aid of the BBC's Children In Need appeal, so I drove over with some machines to try to ensure all the UK released Commodore Amiga models were represented on display.

Once arrived, I said hi to Steve and a few people, then I grabbed a little bit of table space and set up the equipment I'd brought along. After a little while, Stephen Jones turned up and set up his very well specced and expanded original Commodore Amiga (A1000) with a camera and capture card. At this point, I realised my faux pax as this was the chap behind the A1500 case replacement kit for the A500 from Checkmate Digital... and I had just set up a Commodore Amiga... 1500. Ahem. He noticed, and I got mildly embarrassed! I'll be doing an article on Commodore UK later in the year, which will explain that to those who don't know the story.

The rest of the other tables reserved for displays were all being set up during the morning as registration for the event started at midday with the room opening at half past, so once all my stuff was up and running, I had a little wander around. Though not huge, the event room was comfortable enough for the numbers coming and had air conditioning, which in a room full of Amigas is no bad thing.

At the rear of the room was an array of machines with not only another Amiga 1000 (and frankly I think this might have been the first time I'd seen two units of the machine in the same room, as they're not exactly commonplace in the UK or Europe) but also an A500, A2000, A3000, CDTV, A600, A4000 and A1200. With my CD32 next to my A1500, combined with an A500+ from Tristan Cobb/The Silicon Vault gave the room the full complement of UK released machines, bar the rarity that was the A3000T and Commodore's hand built, and rarer than the C65, A4000T.

AmigaKit, A-Eon Technology and Hyperion Entertainment were all setting up at the rear of the room too as the AV and PA equipment was all going into place ready for the attendees to arrive. I then discovered that the number of Amiga musicians coming had grown since my last check, as Allister Brimble, Tim 'CoLD StoRAGE' Wright, Mike Clarke and Jon Hare were being joined by Bjorn Lynne and Andrew Barnabas.

The event had yet to officially start, but the atmosphere already promised a lot. You'll find out more in the next Amiga Mart in two weeks!

Some of the Commodore Amiga machines on display

Amiga 1200 Case Kickstarter

Phillippe Lang has put together a Kickstarter campaign to bring new Amiga 1200 cases to reality using plastic that will resist turning yellow with age as they feature plastic with UV resistance. The lowest pledge to get a casing is €79, but considering the limited small run etc. this is reasonably good value (approx £55 before shipping).

However, these are enhanced casings with easy cut-outs and custom blanking plates for various popular A1200 enhancements, including holes for a CF card, a trapdoor expansion cover with ventilation, rear blanking plate with HDMI or DVI out and a display slot for the read-out from the HxC floppy disk drive emulator (see hxc2001.com). They even have a set of embossed signatures inside, A1000 style!

What's more, colour options are available including (more expensive) limited colour runs.

Don't hang about, though: the Kickstarter ends on 20th August! Check it out at **goo.gl/pzrQ8K**.

Sven Harvey has been our Amiga specialist for over 16 years drawing on his 25 years retailing computer and video games and even longer writing about them.

Amiga

Nuthin' But A 'G' Thang

Ian McGurren returns to familiar ground

Ian McGurren is a professional IT analyst, a semi-professional writer and a pretty amateur electronic musician. He likes gadgetry and loves making gadgets do things they were never designed to do

Though there have been thousands of mobile phones released since their invention, there have been only a few truly defining devices. Some, like Motorola's DynaTAC, were pioneering. Others, like Apple's iPhone or Motorola's StarTAC, were devices that transcended beyond technology into style. But those that have made the biggest impact have often been the ones that opened up this new technology to a whole new, bigger audience. In the pre-smartphone era, that award was jointly held by Nokia's 5110, 3210 and 3310 handsets, each selling millions of units and bringing mobile telephony to the masses. In the smartphone era, it's not been quite so clear cut, but if there is a contender, it has to be Motorola's Moto G.

Released in 2013, the first generation Moto G was, at the time, ground-breaking in terms of power and capability ratios to price. Before this, most budget handsets were lacking at best and frankly unusable at worst. Then, in came the Moto G, with its HD screen, quad-core CPU and vanilla, updatable Android, all for under £130, SIM free, and the game was changed.

Since then, SIM-free ownership has become more prevalent, and the Moto G, its various iterations and its little brother, the Moto E, have become the phones of choice for those wanting a good device for a small outlay. What's more, the Moto G has forced other manufacturers to reconsider what they claim to be a worthy budget device.

So the G-train rolls on into 2015, and we get the third revision of the budget favourite. Thankfully it's a little more of a bump than 2014's model, which essentially gained half an inch, 4G and a micro-SD expansion, depending on which version you got. In 2015, though, there's 4G out of the box, and while there's no change in the screen size or resolution (it's still a great example anyway), the CPU and GPU have changed. Now featuring a 64-bit, Android M-ready 1.4GHz Snapdragon 410 with a Adreno 306, there's also a nicer 13MP rear camera and a rather impressive 5MP front camera too (I'm sorry, I refuse to call it a 'selfie' camera).

Other highlights also include an actual flash (finally!), proper IPX7 waterproofing and a higher-grade build and design, as the Moto G is now included as part of Motorola's Moto Maker customising line.

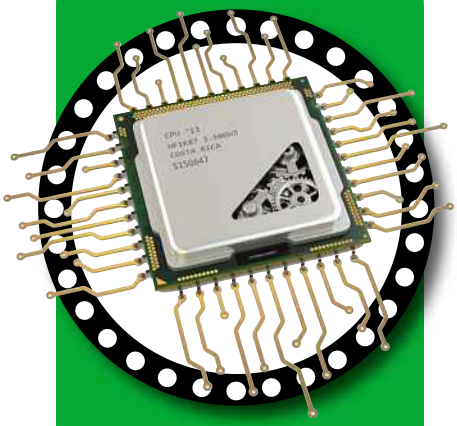
So while there's no misunderstanding of which version may or may not have 4G or expandable memory and so forth, there are still going to be two models: a lower-end version with 1GB memory and 8GB storage for around £159 retail (£179 on Moto Maker for custom units), and a 2GB / 16GB model starting at £209.

Those in the know will want the 2GB version, especially with the Moto G being likely to get Android M very soon after launch. But then £209 isn't quite the bargain of the past, and many premium devices, like the LG G3 are regularly found for around that on the likes of Amazon Warehouse. However, while they may have the edge in terms of hardware, the Moto G 2015 is still a pure Google device (well, with a bit of Lenovo) and will get the new shiny toys first.

So another year, another Moto G, though this one looks to be the most complete and competent since the first, and while Chinese phones are making inroads all the time and budget handsets are not what they used to be, the original G on the block still rules.

Synology's Big Day Out

Synology's events are always fun and trendier than a London postcode, writes Andrew Unsworth



Those who know NAS devices know that Synology is a big name in the industry. It's a popular brand, not just because of its top-notch hardware but because of its extra-top-notch operating system too. DiskStation Manager (DSM) is the OS that makes Synology devices work their magic, thanks to an impressive degree of flexibility and the fact it looks and feels like a desktop operating system. Users can even download and install Synology and third-party apps on their NAS devices to extend the functionality of their NAS, with examples being a McAfee anti-virus app, the Apache TomCat web server and Surveillance Station, which lets users see the video feeds from IP cameras and view and record videos among other features. This powerful operating system not only makes Synology devices more powerful but less intimidating and more user-friendly too.

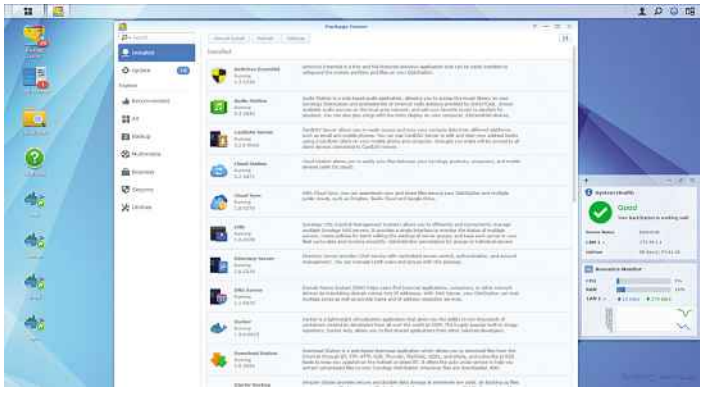
To foster more of a community spirit, Synology runs events where its business users, its home and enthusiast users, and journalists can see and use new and existing devices. One such event is an annual unveiling of the latest version of DSM, and this year the event is to be held on Wednesday 16th September at 8 Northumberland Avenue in London's trendy Charing Cross district, which is just opposite London's trendy Southbank district and in between London's trendy west-end and east-end districts. The new venue should be much easier to get to than the old one, especially if you're coming into London from elsewhere in the country and you aren't familiar with the city.

> "Synology top brass will be on stage to talk through new hardware and software developments"

Synology top brass will be on stage to talk through new hardware and software developments, and hand out some great prizes and goodie bags (if last year's event is anything to go by). Last year's event took the form of a number of short, theatre-based seminars with breaks in between and plenty of time at the beginning and end to get hands-on with the gear, if you could get near it. According to Synology's press release, the venue has changed to 8 Northumberland Avenue due to a need for more space. Having been to two events at the old venue, I'd agree with that, as there wasn't much space to move around in the reception area due to the popularity of the event.

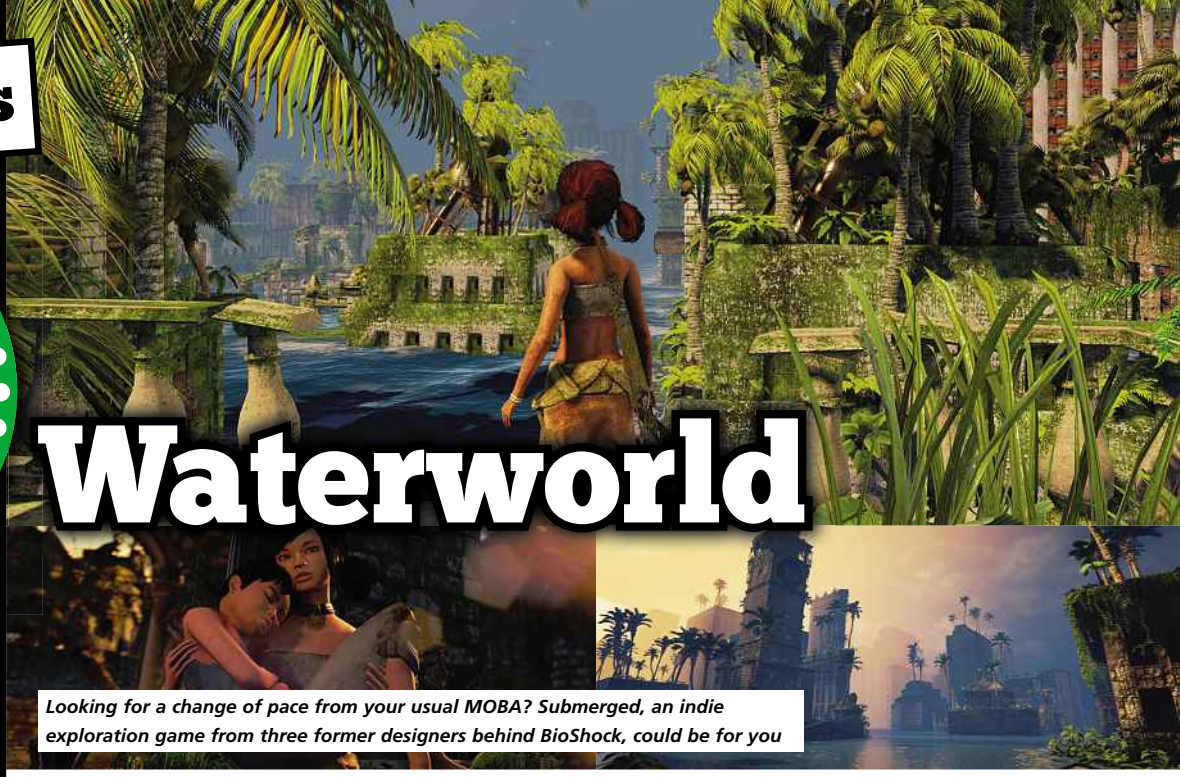
Joanne Plummer, Synology's marketing manager, says "As always, our development team have worked tirelessly to develop the best software possible for our devices and customers. I am excited to see the new updates myself, and the new venue is stunning. Our guests are in for a real treat this year. Synology users… get excited!" Synology's new managing director Yi-Lin Huang will also be around for chats and presumably to give the keynote speech.

To reserve a place at this free event and to see the agenda, go to **www.synology.com**.



Andrew Unsworth has been writing about technology for several years, he's handy with a spanner, and his handshaking skills are second to none

Ryan Lambie has loved videogames since he first stared up in awe at a *Galaxian* arcade cabinet in his local chip shop. 28 years on, Ryan writes about gaming for Micro Mart. He's still addicted to chips and still useless at *Galaxian*



Waterworld

Looking for a change of pace from your usual MOBA? Submerged, an indie exploration game from three former designers behind BioShock, could be for you

This week, Ryan checks out Submerged, a new indie game from three designers behind BioShock, and takes a look at the Deathmatch mode in Star Wars: Battlefront...

Plug & Play

When you consider that we're now many years on from the golden age of the arcade, it's surprising to consider the number of games that adhere to the old tenets of the coin-op: kill or be killed, a constantly rising challenge, three lives and you're out. They're the kind of boundaries that can result in addictive, challenging experiences, sure, but they were born of an industry keen to ensure a high turnover of players. Unless you're a championship-level gamer, the average go on *Donkey Kong* is probably about two minutes, for example.

However, some designers are looking far beyond this style of game. Take *Submerged*, the debut title from Canberra-based Uppercut Games. It's a 3D adventure set in a post-apocalyptic world where entire cities lie partially consumed by rising water but, unusually, there are no drooling radioactive monsters waiting here to eat you. In fact, *Submerged* is distinguished by its lack of combat and absence of death. Despite the expanses of water, you can't drown; despite the remains of skyscrapers poking up into the sky, even the most clumsy player won't fall to their doom.

In *Submerged*, you play a girl called Miku, whose task is to find medicine and supplies to help her desperately sick younger brother. That's the objective, at least; otherwise, you're free to clamber into your little boat and explore to your heart's content. Like The Chinese Room's *Dear Esther*, or Fullbright's *Gone Home*, *Submerged*'s appeal comes from traversing the game's environs and absorbing its atmosphere. Dotted around, you'll find old symbols and other clues that hint at what happened to what was once a populous city.

There was some discussion in certain quarters as to whether *Gone Home* even qualified as a videogame, but we'd argue that there's more to the medium than offering the player a challenge. Besides, *Submerged* has a great pedigree; Uppercut was formed by three former staff at the now defunct 2K Australia, which bought us the likes of *BioShock* and *Tribes: Vengeance*. You can certainly see more than a hint of *BioShock*'s world-building in *Submerged*; not just in the expanses of water, but in its atmosphere. The Big Daddies and blasting may be gone, but that game's spooky sense of mystery still lingers in *Submerged*, which is available now from Steam.

Online

Sci-fi shooters are one thing, but what about the chance of taking to the skies in the Millennium Falcon, or charging across the icy wastes of Hoth as an Imperial Stormtrooper? Those are the kinds of experiences EA DICE is selling its forthcoming *Star Wars: Battlefront* on – a multiplayer shooter with lovingly recreated characters, locations and vehicles taken straight from the George Lucas-verse. Over the past few months, *Battlefront*'s Swedish developer has been gradually pulling back the covers on the game, with two trailers showing us what a multiplayer match on Hoth will look like, as well as a co-op 'survival' mission on Tatooine.

EA DICE has now also revealed what it calls 'Blast mode', a 10-versus-10 Deathmatch with simple rules: it's Rebels against Imperial forces, and the first to reach 100 kills wins the game. Just to mix things up a bit, the mode will dispense with the garage full of vehicles you'll find in other modes (so no AT-ST walers or Speeders here), and you won't see characters like Luke Skywalker or Darth Vader, either. Instead, it aims

Star Wars Battlefront is getting its own Deathmatch mode. In Blast, 10-v-10 battles take place in confined, weapon-strewn maps. Greedo really does shoot first here

to offer an exhilarating quick fix, with bouts lasting no more than 10 minutes.

To give each Deathmatch variety, the Blast mode will, like the rest of the game, take place in such locations as Hoth, Sullust and Tatooine – and you'll probably catch sight of a familiar-looking mobile base favoured by those sneaky little Jawas.

"One battle you'll be fighting within interior levels on Endor or Sullust," level designer Dennis Brännvall explains in EA's recent site post. "In the next battle, you might find yourselves among Tatooine's dusty canyons, or inside the undeniably cool Ice Caves on Hoth. My favorite is the verticality of Tatooine, fighting by the Sandcrawler."

Each Blast map has been designed specifically for close-quarters, contained Deathmatches; an image released by EA shows a group of Rebels fighting Imperial Stormtroopers in what looks like some sort of loading bay – there are industrial-looking girders and beams everywhere, and metal trunks that may or may not provide a means of cover. Also noteworthy is the sight of a Rodian bounty hunter (a Greedo look-alike, in other words) taking pot-shots at a Stormtrooper.

EA DICE says there'll be plenty of weapons strewn around the various battlefields to keep things interesting – plus things like gun turrets that could quickly turn the tide of a match in your favour.

"Whether you pick up a Droid scanning for nearby enemies or a turret that'll control a zone for you, the pickups can really turn the tide of a Blast match," Brännvall says. "They are not around every corner, though, so keep your eyes peeled."

Star Wars: Battlefront is out on the 20th November.

Incoming

Readers with long memories may recall Ubisoft's icon-based adventure game *Zombi*. Closely inspired by George A Romero's movie *Dawn Of The Dead* (called *Zombi* in Europe), the game saw the player attempt to save a group of human survivors from a ravenous horde of the undead. The spirit of that game was then revived in 2012 with *ZombiU*, a first-person survival horror game for Nintendo's Wii U.

The console's slow sales meant that Ubisoft's decidedly gory counter-programming didn't take off either, but *ZombiU*'s back – now simply called *Zombi* – and shuffling menacingly towards its PC release. If you're wondering why you should care about a three-year-old console game, consider this: the original game got some glowing reviews, and its zombie slaughter was spiced up a perma-death mechanic; die as one character, and you take control of another, and in order to get all your old items back, you have to track down your now-zombified former self and kill them. It's a simple but effective idea and, judging by the recent reveal trailer, it looks like one that's been smartened up nicely for the PC, too.

Zombi will be available to download on 18th August.

Formerly a Wii U exclusive, Ubisoft's Zombi is a survival horror game where death is ever-present. It's out on the 18th August

AD INDEX

2/3 CCL

6/7 Morgan

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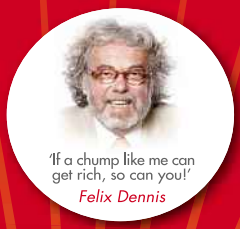

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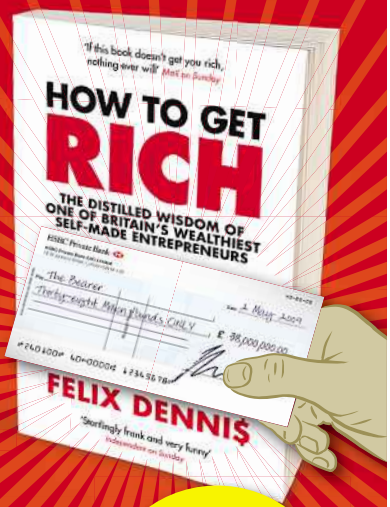

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Laptop DDR2 memory sale. 2 Corsair Value Select 533mhz 1GB £18 pair, 2 Hynix 800mhz 2GB £26 pair, 2 Generic 533mhz 1GB £15 pair,1 Generic 800mhz 1GB £10,1 Nanua 666mhz 1GB £, 1 Samsung 666mhz 1GB £8. Postage included *Tel: Jeremy Gill (02089) 430683 Email: arthur.pewty1@virgin.net*

2x 120GB Maxtor DiamondPlus 9 Drives plus 1x 80GB DiamondPlus 10. Can be supplied with 2x plug-in caddies. Reasonable offers please.
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Email: alan@asandco.co.uk

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Toshiba C500D-B-11 laptop. Almost new cost £279 will accept *£150ono*
Tel: (01217) 535324

Intel 3930K processor. Used, but not overclocked. No box or fan. £220 ono. Will ship to UK address.
Tel: Tim (01623) 624509
Email tim.stirland@btinternet.com.

Amstrad PcW 9256 in good working order with software. Offers.
Tel: John Adams (02088) 641202
Email: meeching@uwclub.net

Asus P8Z68-v LX socket 1155 motherboard. Original box 1/0 cover user guide driver disk fitted core i3 2100 CPU 3-1GHz and 8GB PC1300 memory. No fan. Working fast and fine. £125 + free postage.
Tel: (01619) 501218
Email: jmbest2@sky.com

ASUS P5B Motherboard - 775 Socket - DDR2. Tested and removed from a working environment, comes with I/O Plate. £35 inc Free Courier. Payment via PayPal.
Email: info@jmcomputing.info

SAMSUNG GALAXY Tab 3 for sale. 2mths old, 8GB, wi-fi, £80 open to offers. Willing to post at a charge.
Tel: Christine (01386) 831836

HARDWARE WANTED

Trying to breathe life back into an old machine? Why not submit a wanted ad and see if any of the thousands of computer enthusiasts who read the magazine each week have what you're looking for?

WANTED: PC Tower case (beige colour if possible) to rehome an Amiga A1200 vintage computer. The Amiga motherboard is H 410mm x L 190mm (H 16" x L 7.5"). PSU not an issue but if available 250 watt more than enough.
Tel: Bill (07742) 061569 or (02641) 769503.

WANTED: Fractal Design Define XL full tower case. R1 (original version) in black.
Tel: (01670) 860146
Email: mm@tectron.co.uk

WANTED: Working Dot Matrix Printer in Good Condition. Thanks!
Email: printer.20.odaily@spamgourmet.com

WANTED: Acorn computer either an A5000 or A7000. Also book on teaching yourself binary.
Tel: (07817) 861011
Email: Johnhaviland73@gmail.com

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Do you have old software that you simply don't use? Why not advertise with us and see if anyone else can make use of it – you may well be surprised to find that someone is looking for it!

Adobe Photoshop Elements and Premiere Elements 12 Full Version - Windows/Mac. Original Boxed CD with unused product key. £47.50
Tel: Ian (01932) 856971
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PCB design software 127 layers, schematic entry, PCB entry, PCB to Gerber file converter, output to printer. £9.99
Tel: Nigel Wright (07967) 527693
Email: cresswellavenue@talktalk.net

Cyberlink PowerDVD 12 Standard. Runs under Windows 8, 7, Vista or XP. Original CD with unused product key £7.50
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Microsoft Office 2013. Original Software only £100.
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E-mail: scobieg09@gmail.com

Sim City 2000. Boxed and original. Classic gaming. £15.
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E-mail: scobieg09@gmail.com

Norton Family Premier 2.0. Runs under Windows 8, 7, Vista or XP, Original Symantec unused product key £15.
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

Nuance Omnipage 18. OCR for Windows 8, 7, Vista or XP, Original CD with unused product key £25.
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

Acronis True Image Home 2012. Bootable CD. Application runs under Windows 8, 7, Vista or XP. Original Acronis CD with unused product key £5.
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

SOFTWARE WANTED

Wanted: I have a BCL 2.4g Wirless Gaming Mouse, Model: RF0P77 (3v 7ma) but no Drivers. Can someone help with a copy of the Original Drivers for this Wireless Mouse>??
cliffordevans603@btinternet.com

Wanted: Driver disc for Toshiba L30-11D PSL33E laptop. Laptop useless without drivers but only worth £40, so cannot pay a lot.
Tel: John Udall (01384) 824494
Email: john.udall@blueyonder.co.uk

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• Be wary of anyone who insists on you paying by the above methods if in doubt, get us to check them out by mailing editorial@micromart.co.uk

• Keep copies of all correspondence

• When sending out goods, at the least obtain a certificate of posting from the Post Office

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Aaron Birch
Micro Mart
Dennis Publishing
30 Cleveland Street
London
W1T 4JD

Contact Aaron by email at:
aaron@micromart.co.uk

Please try to keep your queries brief and limit them to just one question per letter, simply so we can squeeze in as many as we can each week. Please include relevant technical information too.

Aaron

Ever Decreasing Space

I have a very strange problem, one I've not come across before, despite 20 years of using and rebuilding computers.

About six weeks ago, I suddenly got a pop-up message from Windows 7 Notifications that there was insufficient space on my C: drive. On investigation, I found I only had about 4GB of space left on a partition of 150GB, so I uninstalled a number of programs I rarely use and then ran Defrag, but this only freed up about 10GB.

On the previous occasion I'd run Defrag, I had more than 50% free space left on the drive.

I then downloaded Mini-Tool Partition Wizard 8.1 and extended the C: drive to 200GB, resizing my Data partition, 'D', in the process. I also have a Back-up Partition, F:, on the same 1TB hard drive.

A fortnight ago, I again got a notification that there was insufficient free space on my C: drive. This time, there was about 5GB free, so I again used Mini-Tool 8.1 to enlarge the drive – this time to 300GB.

Today, I find there is less than 20GB of free space on my C: drive, so I have now reduced the size of both my Data and Back-up partitions and increased the C: drive to 500GB.

During the past few weeks, I have cleaned my HDD of excess baggage, but only managed to remove about 20GB of stuff in the process. I've also run MalwareBytes Anti-Malware and also the Free Sophos Virus Scanner, having first run Kaspersky Internet Security 2015, which I've had to uninstall and reinstall, and each time I extended the C: drive, as it failed to boot.

Another problem I'm having is that after about a week or so, Kaspersky suddenly stops doing a full scan and closes down after about 2,000 files. Normally, it takes about 90 minutes to scan the whole of my computer.

In addition to the above, I've run Chkdsk on my C: drive and it says that the partition is clean. I've also downloaded and run MyDefrag, as I am fully aware that the built-in Windows defrag is rubbish, having set it to defrag automatically and manually, at various times. Neither seems to do a good job, although I'm still not sure that MyDefrag is any better.

As I'm not a big downloader, nor do I upload much, I'm at a loss as to what the problem may be or what I can do to stop the free space shrinking faster than I can increase it.

I'm starting to think either a reinstall or a new hard drive, as the current one is about two years old.

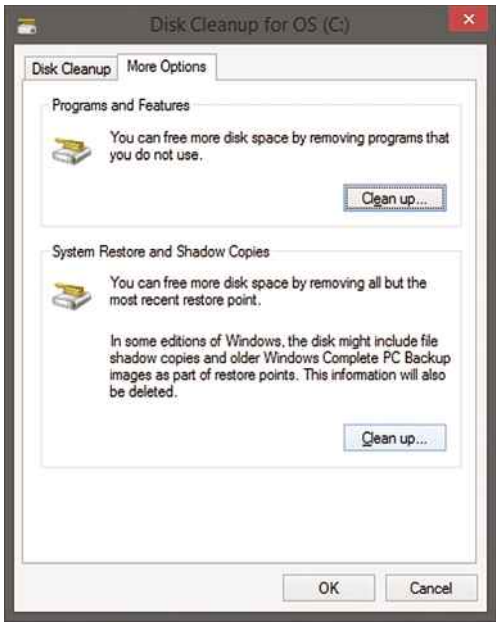
Have you come across this problem before and if so, what's the cure? Is my computer being used as a spam Relay, despite Kaspersky, Sophos and MalwareBytes?

Russ

Although there could be many potential causes for this problem, I wouldn't worry too much about your situation in terms of viruses, Russ. From your detailed description and some of your installed programs, I think I know how to remedy your HDD capacity woes.

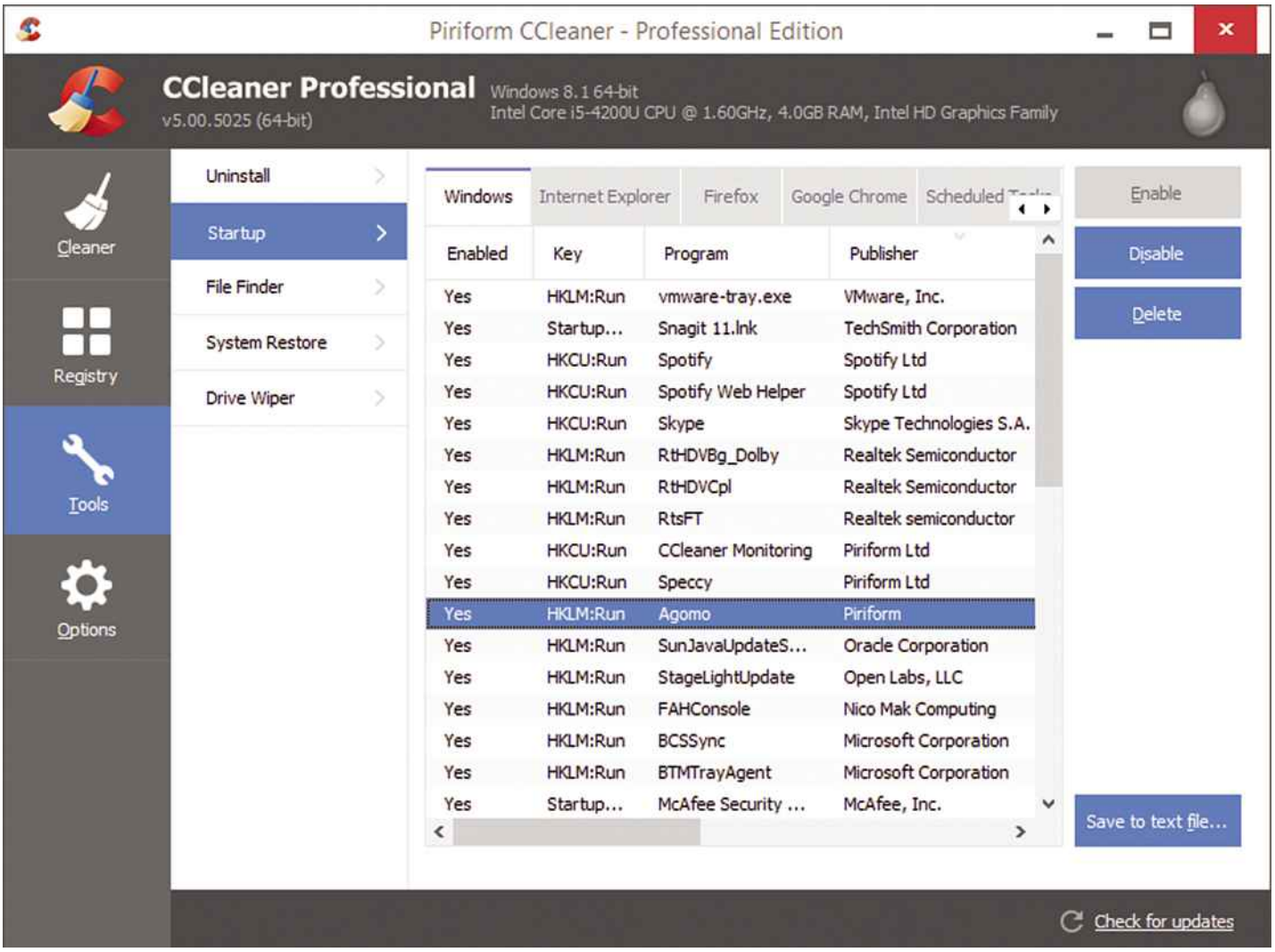
I suspect there are two main culprits that are contributing to the mysterious space loss: System Restore and Kaspersky. A third problem may well be down to general junk files, but let's look at the others first.

Windows' System Restore is a useful tool, but in order to operate, it needs to create restore



System Restore can take up plenty of HDD space, but Disk Cleanup can help

If HDD spacd is a problem, you can disable System Restore or limit the amount it can use



▲ *Ccleaner can be a major help when it comes to tidying up a cluttered system*

points. These are essentially images of your PC at the time the point is created. These are created by System Restore either when you manually opt to create one or automatically when a major system change takes place, such as a Windows update, driver installation or program installation. When you then need to roll back your PC, you can do so by restoring these images. This is good, but it all takes up a lot of space.

Each restore point created needs space on your hard disk(s), so the more you have, the more space that's used. This could well be one of the main reasons you're losing space, so you should check this, and if you prefer, delete all but the most recent restore point. You can do this in many ways, but one of the easiest is to open up Explorer and right-click on Computer. Select Properties and then choose System Protection.

The System Protection dialogue box will open, and you'll see the button for System Restore. Don't click this, though, and instead click the Configure button below it. You'll now see the options you require. If you look to the bottom of the window you'll see a Delete button. This can be used to delete all but the most recent restore point, which will likely free up a lot of space.

Also in this window are options to disable System Restore, although this isn't really recommended, as it can be useful. More useful is the slider you can use to limit the amount of disk space System Restore can use. You can alter this so far less hard drive space can be monopolised by restore points, which may be the solution you need if the current setting is too high.

Next, take a look at your anti-virus app, Kaspersky. Many users have noticed that this application can store very large log files, sometimes in excess of 15GB. If this is the case on your system, it's very possible that this is contributing to the problem. Have a look for these log files and delete them as necessary.

*Finally, it's always worth getting a second opinion on system junk files. Although you've already done a bit of cleaning and a defrag or two, I'd download Ccleaner (**www.piriform.com**). Run this and it'll perform a complex sweep of your PC, looking for junk files and other problems. It's great at freeing up space and getting rid of garbage that builds up in temp files, caches and so on.*

Regarding your problem with Kaspersky's scanning stopping unexpectedly, the above cleaning may actually help resolve that, but if not, I'd try uninstalling and reinstalling the latest version (if you haven't already). Also make sure you're not running any other conflicting tools. McAfee's Site Advisor has been known to cause problems, and other similar tools could also affect it. It may be worth trying to perform a full scan while in Safe Mode, just to eliminate other software interference. Good luck.

ASK JASON

Meet Jason D'Allison, a veteran of Micro Mart's panel of experts. He's here to help with any technical questions, including anything to do with tablets or smartphones, as well as PCs

Send your questions to:
Jason D'Allison
Micro Mart
Dennis Publishing
30 Cleveland Street
London
W1T 4JD

Contact Jason by email at:
jason@micromart.co.uk

While we try to cover as many questions as we can, we regret that Jason cannot answer your questions personally, but he'll cover as many as he possibly can each week. Please ask one question per letter and remember to include the full specification of your computer, including its operating system.

Jason

Onedrive To Rule Them All

I signed up to Office 365 a couple of months ago, and I'm now starting to use the bundled 1TB of OneDrive cloud storage. I'm making backups of my PC's music, videos, photos and so on. When I try to copy the videos folder, though, I receive the following error: "There is not enough space on OneDrive. You need an additional 4.72GB to copy these files." However, when I log into OneDrive online, I can see that 964GB of my 1TB is still free. So what's going on? The videos folder is about 40GB in total. Is it just too big? I'm using Windows 7, if that makes any difference.

Gary, Gmail

I think this is happening because your hard drive's nearly full. Ordinarily, the OneDrive folder on your PC and the OneDrive repository in the cloud carry the exact same contents; whatever you put in one is automatically synced (copied) to the other. Because of this, if you used 1TB of space in the cloud, you'd also need 1TB of space on your PC.

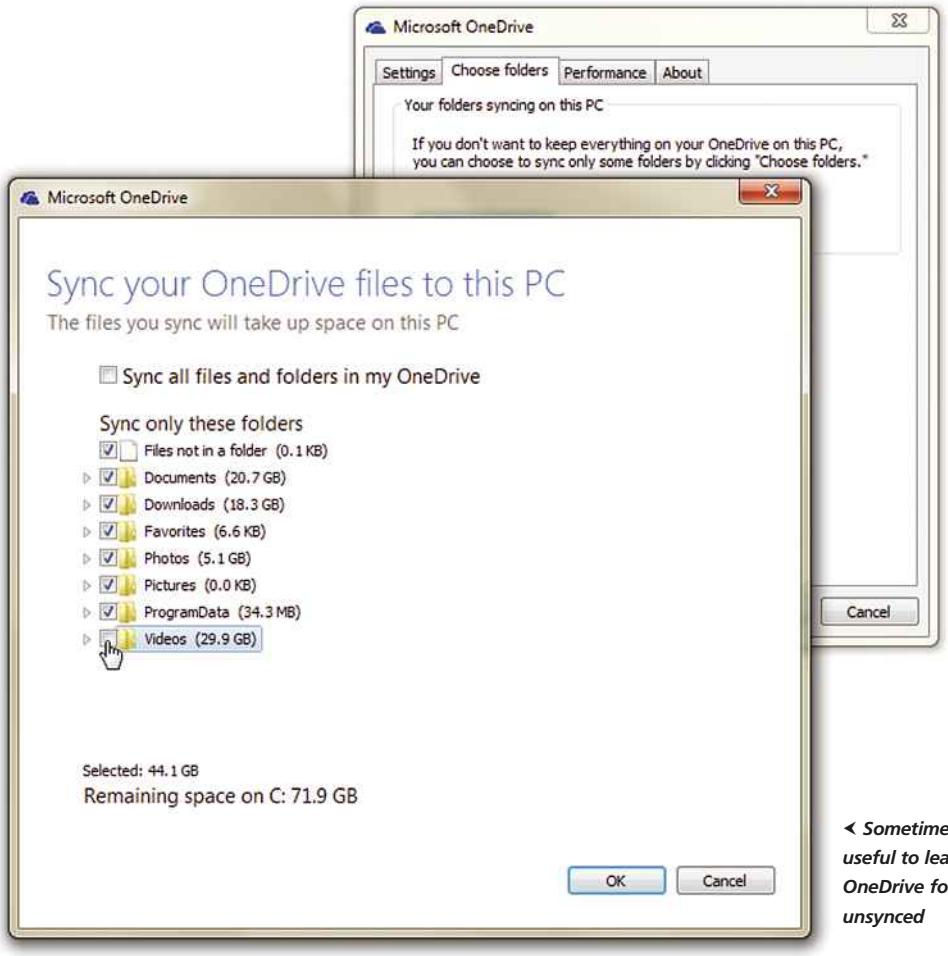
*As I understand it, Gary, you're **copying** your data. Your PC therefore has two copies of every file – one in the original folder and one in the OneDrive folder (plus another copy in the cloud). If you did this with 1TB, your PC would need 2TB! The error you're receiving refers not to your OneDrive allocation but to your hard drive.*

*Ideally, you should **move** your data. Use the OneDrive folder for everything – set up appropriate subfolders within it. Forget about the traditional folders Windows provides – Documents, Music, Pictures and so on. You just need a slight update to the way you think, save and work.*

OneDrive isn't really a backup solution, though. Few cloud services are. It's really intended simply as a means of making your important data available to you on all your devices and from anywhere with internet access. For example, if you accidentally deleted a file from OneDrive on your PC, it'd be deleted automatically from OneDrive in the cloud. That's not much of a backup!

A way round this is to sync only certain folders. Once you've synced your videos folder, for instance, right-click the OneDrive icon in the Windows system tray, click the 'Choose folders' tab, click the 'Choose folders' button, and untick the relevant box. The folder will then be deleted from your PC but retained in the cloud. You'll only be able to delete files from it if you log into the OneDrive web portal – a pretty decent safety-net. The snag is that you'll have no direct access to the folder from your PC.

*Note – In OneDrive on a phone or tablet, **no** folders are synced by default. Files have to be downloaded as and when. This is because phones and tablets usually have very limited storage.*



Sometimes it can be useful to leave certain OneDrive folders unsynced

Bulletproof Windows?

I own a Nokia Lumia 635 phone, and I'm a little concerned about security. At the moment, I'm not running any anti-virus software. Is Windows Phone 8.1 already protected? On my PC I use AVG, which is available for Android but not for Windows Phone. What alternative do you recommend? I'm happy to pay for it.

Simon, the Post Office

There's no alternative, Simon. Anti-virus software isn't needed (at least for now). A search in the Windows Phone Store reveals Avast Antivirus Analysis, a spam app not from Avast, and Antivirus for WinPhones, a 'placebo' app that does nothing (it's quite funny).

All phone OSs are pretty secure by design. This is because apps are sandboxed: they're isolated from the OS's core and can only interact with other apps if granted permission.

So why are there anti-virus apps for Android? Well, apps on iOS (Apple) and Windows Phone are vetted before being published, but apps on Android aren't (except by an automated malware scanner). Google prefers to foster developer freedom and an open marketplace. Rogue apps do therefore slip through. Mind you, Google is swift to pull such apps once they're reported, and as there are over a billion Android users, they get reported quickly. Just don't be one of the first few hundred people to try a new app!

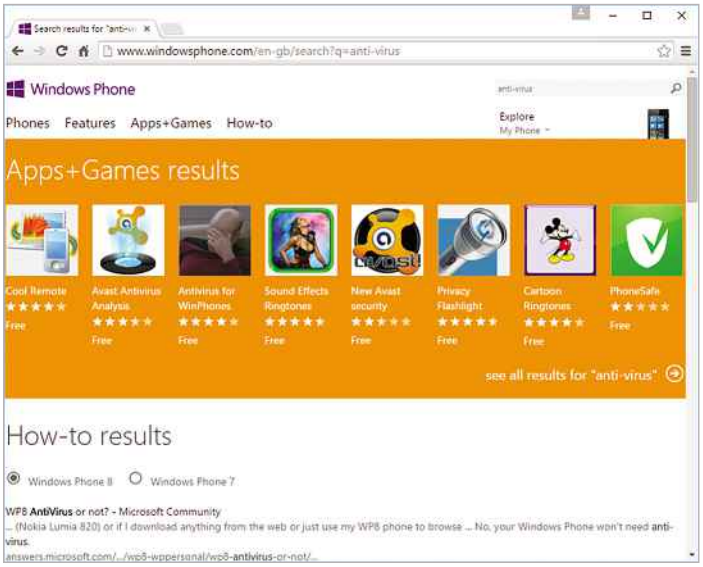
Android is all about flexibility. To this end, it can be easily rooted. This gives the user – and apps – unrestricted access to the OS's guts (Linux), which has its benefits but also knocks out most of the security. Windows Phone can't be rooted (not in software). iOS can be jailbroken, which is similar to rooting.

Also, the 'proper' way to install apps on Android is via Google Play or other official app stores – Amazon's or Samsung's, for instance. But by enabling 'Unknown sources' in Android's settings, users can 'side-load' apps (in the form of .apk files) from anywhere they like. Clearly that opens up risks.

Of course, 99% of Android users in Western territories don't root and don't side-load. In those cases, Android is almost as secure as any other phone OS. The scare stories about rampant virus infection – which Apple and Microsoft no doubt encourage – really only relate to phones used by enthusiasts and people in China (where phones are typically pre-rooted and don't come with Google Play).

*Even on Android, Simon, anti-virus apps are sandboxed just like all other apps, so what they can scan and fix is severely limited (they don't request root access). For 'normal' users, they're mostly a waste of time. I **do** root and I **do** side-load, and I also install custom ROMs, which could potentially contain all sorts of nasties, yet in five years as a pretty heavy user I've never once seen a virus.*

Does Windows Phone need anti-virus software? Is any such software even available?



Taking Control

I've upgraded to Windows 10, and I want to manually tweak ClearType (to my eyes, most text looks a bit fuzzy). I'm finding Windows 10's Settings app quite limiting, though. I don't think ClearType is even mentioned. In Windows 7, the ClearType options were in Control Panel, but does that even exist in Windows 10? I can't see any sign of it.

M Williams, Staffordshire

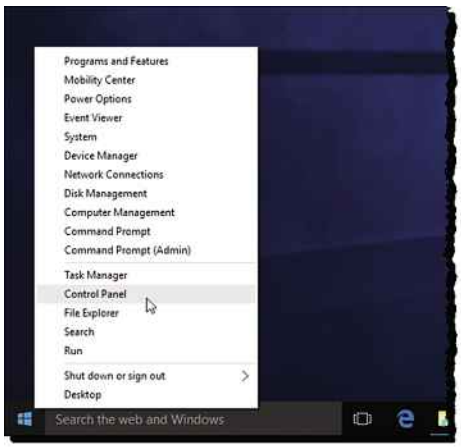
Windows 10 does indeed have the good old Control Panel. You're right, though: it's tucked away, as Microsoft wants most folks to use the novice-friendly Settings app. Give a big hand, then, for the 'power user' menu (officially the Quick Access menu). It's available in Windows 8.x, too. Just press the Windows key on your keyboard together with X. This brings up a menu off the Start button, and one of the links is Control Panel, along with Disk Management, Device Manager, the Run dialogue and a raft of other goodies.

Right-clicking the Start button does the same thing. When you're in File Explorer, you can also click the left-most arrow in the address or path bar. This brings up a different menu, one offering quick access to useful locations – OneDrive, Network, Recycle Bin and so on. Plus our old friend Control Panel.*

Windows 10's Control Panel is essentially identical to the one in Windows 7 and 8.x. To access the ClearType settings, click the 'Hardware & Sound' group, click the Display sub-group, then click 'Adjust ClearType text'. Or at any time you can enter 'cleartype' into Control Panel's search bar and get the 'Adjust ClearType text' link straight off.

** On a touch device, long-press the Start button.*

Did you know that Windows 10 has a 'power user' menu?



Crowdfunding Corner

This week, old meets new: one decidedly retro gaming controller and one camera accessory that couldn't be more up to date if it tried

Retro Fighters Next-Gen NES Controller

If you like retro-gaming or retro-style PC gaming, we think you'll be interested in the Retro Fighters Next-Gen NES controller, which is a dual-compatibility controller that you can use in your NES and on your PC or Mac, thanks to a specially manufactured dual USB / NES connector cable.

The controller has a rubberised exterior for comfort, eight buttons and analogue sticks, so it's compatible with modern games – but what it's really designed for is playing retro games that don't need a lot of input. The D-Pad is bigger than standard NES controllers, so it's better suited to adult fingers, and a pair of turbo buttons mean it's tailored to the style of game you're likely to play. You can even use the analogue sticks on retro titles, if that's what you prefer.

Backing the campaign for the reward of a controller will set you back $30 (£19), while higher tiers allow you to get hold of a poster or a T-shirt as well, if you're into that sort of stuff. The project's success is looking tentative at the moment: it has $2,000 of a $12,000 goal with three weeks to go, so it's definitely one that needs all the support it can get, but a groundswell of support could easily help it hit such a modest target, so don't count it out at this early stage!

URL: kck.st/1T4PKiz
Funding Ends: Sunday, 30th August 2015

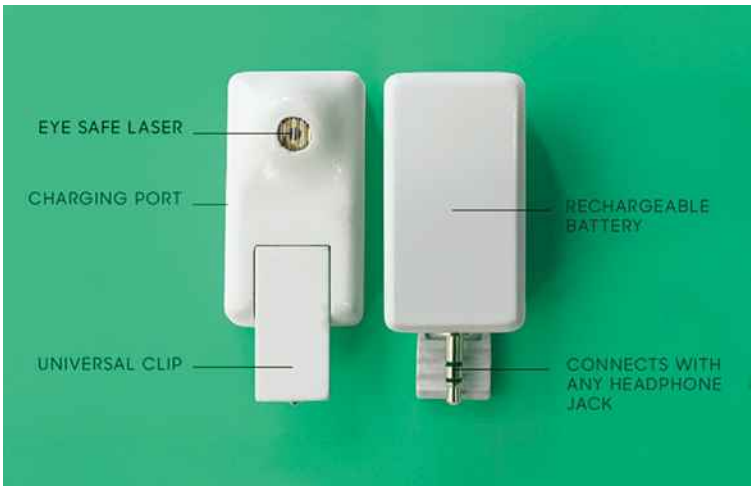
Bevel Smartphone 3D Camera

3D photography is still at an early stage in its life, which means there are several different takes on the idea. The standard, simple way is to use two lenses to create a stereoscopic image. Bevel takes a different route: it uses a type of 3D scanning laser to build up a 3D model, which you can load into a standard 3D modelling tool and even 3D print.

Compatible with any smartphone or camera, Bevel plugs into the headphone jack and combines its eye-safe laser with your existing camera. The resulting 3D photos can be rotated, animated and viewed in multiple angles, and you can place the 3D object onto the photographed background for context. The built-in app supports integration with Twitter, Facebook, Tumblr, WordPress blogs, Instagram, Pinterest and many more, so you can share the images directly.

Although it sounds like an expensive tool, Bevel is surprisingly affordable: early bird tiers were giving it away for as little as $39 (£25), but even now it's available for $49 (£32). The only problem is that there's a limited number available, so if you miss out now, you might not have a chance again until it's actually made. At this point, there's basically no chance of it missing its goal; it's 85% of the way there with 20 days to go, so have a look as soon as possible.

URL: kck.st/1S7n2CE
Funding Ends: Thursday, 27th August 2015



Disclaimer: Images shown may be prototypes and Micro Mart does not formally endorse or guarantee any of the projects listed. Back them at your own risk!

App Of The Week

8Bit Photo Lab

David Hayward goes all retro again

Last week, we took a look at the fantastic retro camera app, RetroSpecs for iDevices. Now we're looking at something similar for those of us who own Android phones and tablets.

8Bit Photo Lab is the brainchild of bespoke software development company Ilixa, with developers Francois Morvillier and Dr Alain Pitiot behind the wheel. First and foremost, it's a bit of fun, bringing some classic graphical renderings to your current picture gallery or to a shot just taken by the camera.

But there's more to this app than simply dropping the colour count to less than 16. You can change the current resolution, up to 4096 x 4096, save the content as JPEG or PNG, set error diffusion, noise patterns, change the colours and even add colour clash to a specific photo.

There are over 40 different systems to apply to an image, which range from GameBoy, NES, TO7/70, Amstrad CPC, Apple II, ZX Spectrum, Commodore 16 and 64, Vic 20, CGA, EGA, VGA and so on. And the overall effect is really quite astonishing and amazingly accurate.

Retro Pics

The main feature, though, is the amount of customisation you can apply to your image, whether that's one from the gallery or one you've just taken with the camera through the app controls.

Naturally, you can stick with the system itself, and applying a Spectrum colour clash to a family portrait is an oddly endearing thing to behold. But beyond that, you can further tune the colours and resolutions and, as we said, create the weird clashes that other systems displayed, using the glitch menu option in the app.

Those with a more artistic bent will be able to come up with something pretty amazing, we think. Those of us who are artistically challenged, to put it nicely, can still get some great retro outputs to use as our Facebook or Twitter profile pics.

And finally, this is an extremely easy app to navigate and use. The simple and uncluttered layout is designed to show the applied effects for the user, rather than drowning them with complicated menus and toolbox additions.

Features At A Glance

- Free and only £1.99 for the Pro version.
- Can create an extraordinary amount of retro system effects with ease.
- Simple interface but powerful results.
- A huge range of other effects.

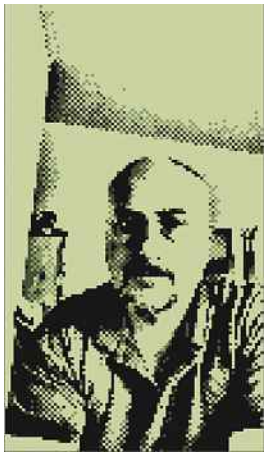
Conclusion

Regardless of whether you like 8-bit artwork or not, there's something good about showing off a picture that's a little different from the usual. The retro system effects applied are more than enough for most users, and when combined with the other photo manipulation elements, the image can be tweaked to near perfection.

We really like 8Bit Photo Lab, and for a mere £1.99 you can upgrade to the Pro version, which offers a greater range of customisations, fonts, borders and more palettes to play around with.

So if you're interested in giving this fantastic retro imaging Android app a go, head over to the Play store at **goo.gl/thl8WE**. mm

Even cats think 8Bit Photo Lab is cool



Applying a GameBoy template

Cromer has never looked good, as the Spectrum sees it

Logging Off

Computing is a lot like life, I've concluded, because there are times that you end up doing things that make no sense, even at the time you're doing them.

This last week, I've been sorting out a problem related to having a child at university, the laptop of whom died.

I sourced a new machine, that was no problem, and it's amazing what you can get these days for relatively little money. Providing Office 365 also seemed the logical thing to do, because Microsoft has a version for university that has a four year licence and can be bought for just £50.

And it also comes with 1TB of OneDrive storage that also solved another problem, as the move to Windows 8.x (or 10) does sort of mandate that you use this to back up your settings. My daughter's default OneDrive 15GB was fully used, so I saw extra value in the upgrade from Office 2010.

However, things started to go pear-shaped from the point I bought the licence, because what Microsoft doesn't tell you is that whatever Microsoft account you're logged in as when you buy, that's the one that it associates with the purchase.

That didn't stop me installing Office 365 on a machine using her account, but it was my account that ended up with the extra cloud storage!

Sheesh. So I cancelled the purchase, with the plan to re-buy it using her account. And then I discovered that her university is signed up to a deal where all students get Office 365 for free, and it comes with 1TB of space.

Any sane person might have concluded at that point that they'd be off the hook, because surely those were the facilities required for free?

Ah, no. Yes, you get Office 365 for the term of the course, but the storage is associated with a university email account, which you'd need to use exclusively to make this all work.

For a short while, I toyed with the idea of using the free student version of Office 365 but buying extra OneDrive space. But 100GB extra is £1.99 a month, or £23.88 a year, or half the cost of four years' Office 365 University with ten times as much space.

It was at the very moment I made that calculation that I realised that we live in a future only Douglas Adams could have possibly conceived. To get a small amount of extra cloud storage, it's cheaper to buy an Office 365 licence for four years than just the extra space.

EDITORIAL
Editor: Anthony Enticknap
theeditor@micromart.co.uk
Designer: Laura Jane Gunnion
Designer: Kevin Kamal
Bonus John: John Moore
Contributors: Mark Pickavance, Jason D'Allison, Joe Lavery, Sven Harvey, Simon Brew, Dave Edwards, Ryan Lambie, James Hunt, Mark Oakley, Roland Waddilove, Salted Caramel Chocolate, Pot Noodles, Sarah Dobbs, David Hayward, Michael Fereday, Ian McGurren, Aaron Birch, David Briddock, Ian Marks, Craig Grannell, Kevin Pocock, Andrew Unsworth, Keir Thomas

Caricatures: Cheryl Lillie

ADVERTISING
Group Ad Manager:
Andrea Mason
andrea_mason@dennis.co.uk

Senior Sales Executive:
Karl Taylor
Tel: 0207 907 6706
karl_taylor@dennis.co.uk

Sales Executive:
Joe Teal
Tel: 0207 907 6689
joe_teal@dennis.co.uk

US Advertising Manager
Matthew Sullivan-Pond
matthew_sullivan@dennis.co.uk

MARKETING
Marketing Manager:
Paul Goodhead
Tel: 0207 907 6393

PRODUCTION
Production Coordinator:
John Moore
Tel: 0207 438 2074
MicroMartAdCopy@gmail.com

Digital Production Manager:
Nicky Baker

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Newstrade Director:
David Barker

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Group Publisher:
Paul Rayner
paul_rayner@dennis.co.uk

Managing Director:
John Garewal

Group Managing Director:
Ian Westwood

COO: Brett Reynolds
CEO: James Tye
Company Founder: Felix Dennis

PUBLISHED BY
Dennis Publishing
30 Cleveland Street
London
W1T 4JD
Tel: 0207 907 6000
www.dennis.co.uk

PRINTING
Printed By: BGP
Distributed By: Seymour

Certified Distribution:
13,712 average copies
Jan-Dec 2010

This does also reveal part of Microsoft's strategy, to make everyone dependent on OneDrive and then screw us for the capacities needed to make this work as seamlessly as Android and Drive generally does.

Now, to be fair, Office does now allow you to sync files to Google Drive and Dropbox, but all your Windows 10 settings must go to the Microsoft Cloud.

Strange, isn't it, that however much the scenery changes, what you actually want remains tantalisingly out of reach? But equally, Microsoft must make money somewhere, given that it can't sell phones or even Windows these days.

So in conclusion, I bought an Office licence when one wasn't needed, to get cloud space I don't really want, on a PC that I won't ever use. Just fabulous.

Mark Pickavance

LAST WEEK'S CROSSWORD

Across: **7** Mercalli Scale, **8** Dublin, **9** Moirai, **10** Styrene, **12** Start, **14** Qubit, **16** Command, **19** Log Off, **20** Encore, **22** Cyberneticist.
Down: **1** Peru, **2** Ocular, **3** Alanine, **4** Biome, **5** Script, **6** Albatron, **11** Tautonym, **13** Lorentz, **15** Isomer, **17** Mocock, **18** If Any, **21** Risk.

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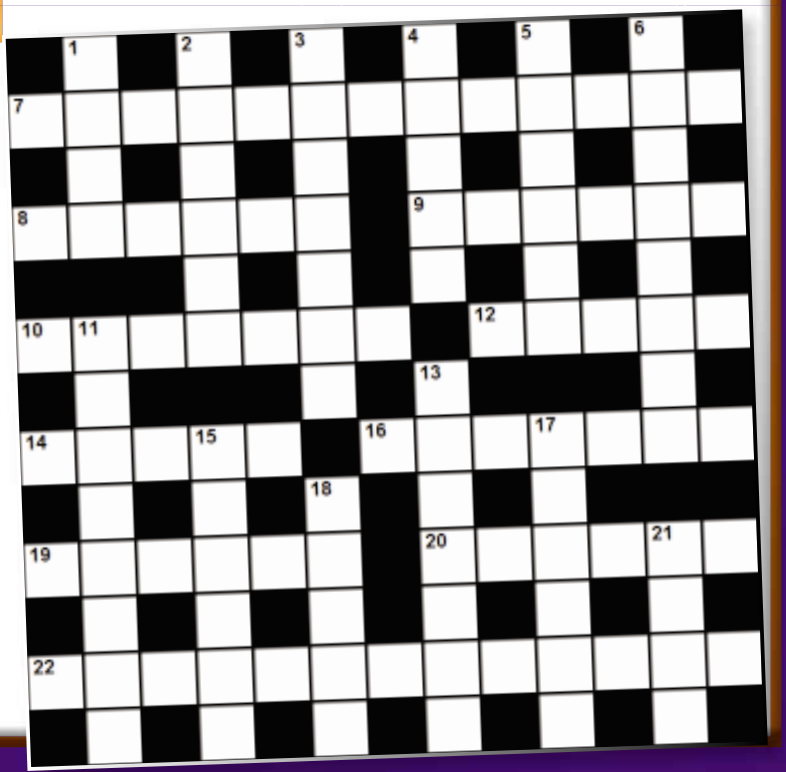
Who knew that decorating a house could be such hard work? Okay, most people probably, but we certainly weren't expecting it. After a few days of painting walls, replacing skirting boards and repairing this, that and the other, we were truly worn out. Parts of us we previously didn't know existed were suddenly making themselves known by screaming out in pain every time we attempted to move. Why can't life be more like videogames? If it were, we could just click our mouse on a piece of furniture or whatever and quickly place it in a room, without putting our back out. But it doesn't work in real life, sadly. No matter how much we waved our mouse around, everything stayed how it was until we actually did something about it ourselves. Plus everyone who was with us at the time kept looking at us funny. Never mind. The important thing is that with all the work we've put in, we're sure to have enough XP to level up soon.

THIS WEEK'S CROSSWORD

Across
7 Tree scientists. (13)
8 A series of 3D computer graphics acceleration cards manufactured by 3dfx Interactive. (6)
9 A gripping hand tool with two hinged arms and serrated jaws. (6)
10 Someone who sends a lot of unwanted emails to promote their products or services. (7)
12 A code that represents letters, numerals, punctuation marks and control signals as seven bit groups. (Acronym) (5)
14 An operating system developed by Bill Gates for personal computers. (2-3)
16 A word of more specific meaning than a general or superordinate term applicable to it. (7)
19 Denoting the standard layout on English-language typewriters and keyboards. (6)
20 A statement that is obviously true and says nothing new or interesting. (6)
22 Description of a person or a collection of such descriptions especially in a historical context. (13)

Down
1 An Access data type that can hold a large amount of text. (4)
2 In agreement or a meeting of the minds. (2,4)
3 SP the legendary chief of the Soviet space programme. (1906-1966) (7)
4 To smoothly transform one image into another using digital tweening. (5)
5 The brightest star in the sky; in Canis Major. (6)
6 Time without end. (8)
11 A string of characters that allows access to a computer, interface or system. (8)
13 A syntactic string of words that forms a part of some larger syntactic unit. (7)
15 In *RuneScape*, a female ogre of Oo'glog city. (6)
17 Combination of lenses at the viewing end of optical instruments. (6)
18 A mythological spirit of nature imagined as a beautiful maiden inhabiting rivers, woods or other locations. (5)
21 European spacecraft launched on 2nd December 1995 primarily to study the sun. (Acronym) (4)



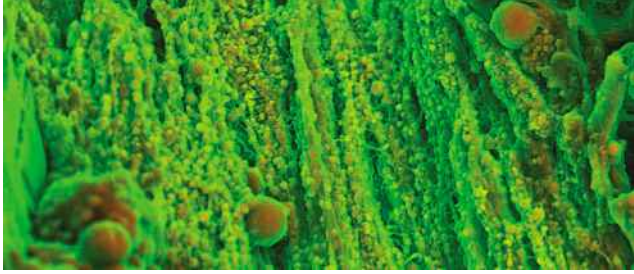
In Next Week's Micro Mart*

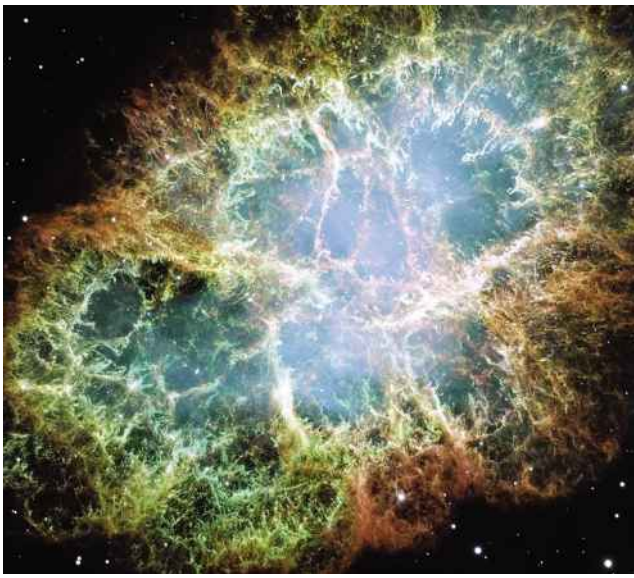
- The best free alternatives to commercial software
- The best of British technology
- More advice on Google's App Inventor
- Plus the usual mix of news, reviews and advice

* May be subject to change

British Science Festival

Bradford 7-10 September





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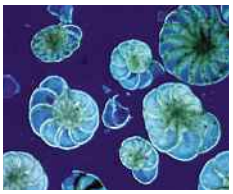

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